



Pulte Homes of New England, LLC
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February 22, 2011

Community Development and Planning Commission
c/o Ms. Jean Delios, Community Services Director/Town Planner
Town of Reading
Town Hall
16 Lowell Street
Reading, MA 01867

Re: Response to CPDC Submission Comments - Reading Woods

Dear Commission Members and Ms. Delios,

Subsequent to our Site Plan Review Submission for Reading Woods made to the CPDC on January 4, 2011, we have received the following comments from the Town,

1. CPDC Certificate of Completeness / Advisory Report dated 1/24/11
2. Follow up email from Ms. Abby McCabe dated 1/27/11
3. Fire Department comment letter dated 1/20/11
4. Conservation Commission comment letter dated 1/20/11
5. FST traffic peer review report dated 1/21/11
6. Mr. Bob LeLacheur fiscal impact comment letter

Please accept this letter and attached exhibits as response to comments items #1, #2, and #3 above. In addition to this letter, please accept the following supplemental reports submitted as response to comments items #5 and #6 above:

- Traffic Impact & Access Study and Response to Comments dated 2/17 (Responding to item #5 above)
- Reading Woods Market Study dated 2/14 (Responding to item #6 above)
- Connery Response to Fiscal Comments dated 2/15 (Responding to item #6 above)

Also enclosed is a complete set of updated site plans, last revised 2/15/2011, resubmitted to address all comments received by all interested parties to date.

Please note that no responses are provided to the comments received from the Conservation Commission, item #4 above. On 2/10/11, we submitted a Notice of Intent application to the

Conservation Commission which commences their full review of our Project, during which process the Conservation Commission's comments will be addressed directly with them.

The following are the comments (in *italic*) and our responses (in **bold**) to the CPDC Certification of Completeness / Advisory Report, to the Public Hearing follow up email from Abby McCabe, and to the Fire Department comment letter.

CPDC Completeness / Advisory Report

- Comment: *The proposal meets the controls listed in the Table of Dimensional Regulations but what are the building heights? The building heights are not clear on the elevations. The maximum allowable height is 55 ft.* **Response: All buildings proposed are less than 55 feet. The 36 unit building height (Bldgs. 1,3,5) is 47'-0" measured from the 1st floor slab to the top of the roof. The 50 unit building height (Bldgs 2,4,6,7,8,9) is 47'-10" measured from 1st floor slab to the top of the roof. The Townhome building height is 41'-7" measured from 1st floor slab to the top of the roof. The actual calculated building height for each building will vary depending upon the actual finish grading along the principal building front, however, as noted, none of our buildings as designed will exceed the maximum building height requirement of 55 ft.. The above building heights are labeled on the renderings, attached as Exhibit 1.**
- Comment: *How many parking spaces are provided in the smart growth district and on the entire site (surface and in garages)? Zoning requires 400 parking spaces in the smart growth area. A more complete parking plan would be helpful showing surface and garage parking as well as handicap spaces. Are there any designated visitor parking locations proposed?* **Response: There are a total of 895 parking spaces provided for the development. 379 spaces are located in the "Smart Growth" district serving 200 units (1.9sp/unit) and 516 spaces are located in the remaining "Business C" district serving 224 units(2.3sp/unit). The required parking in the "Smart Growth" district is 1.6 sp/unit (Sec.4.11.81) and 2 sp/unit (Sec. 6) in the "Business C" district. This would correspond to a minimum of 320 spaces required in the "Smart Growth" district and 448 spaces required in the remaining districts. A total of 768 spaces are required for the entire project. Providing 895 parking spaces provides an extra 127 spaces to be used as guest parking. Guest parking spaces are not designated, the surface spaces are provided on a first come first serve basis. 458 of the total spaces are garage parking, 204 spaces in the Smart Growth district and 254 spaces in the "Business C" district. Each garden building has a minimum of 2 designated handicap spaces and the club house has 1. The updated plans show all proposed parking spaces and designated handicap spaces. Parking garage floor plans were previously provided with the submittal application.**

- Comment: *What are the dimensions and depths of the balconies, projecting bays, and columns? The design guidelines are intended to ensure high quality designs so that the buildings appear less massive and more appealing.* **Response: Four (4) 50-unit ("Smart Growth") buildings are proposed in the GSGD, therefore, this response pertains only to these 50 unit buildings to which the GSGD guidelines apply. The depth of the balconies is 5'-2". The lengths of the balconies vary between the units ranging from 8'-8" to 12'-2". The bay windows project out 2'-0". The decorative columns are 10" in diameter. The two columns located in front of the main building entrance door sit 5'-0" out from the door measured from the center of the columns. The two columns located in front of the secondary building entrance door sit 4'-4" out from the door measured from the center of the columns.**

The Smart Growth building is of high quality design and includes many architectural features added which comply with GSGD design standards. The buildings propose a variety of exterior building materials such as stone, low – maintenance vinyl shake and vinyl clapboard siding, which serve to maintain a visual distinction between upper and lower floors. Projecting bays, decorative columns, roof gables, varied exterior wall planes, and recessed balconies are included in the design to make the buildings appear less massive. Azek trim boards, decorative window heads, window mullions, Fypon louvers are also incorporated into the design to make the buildings more aesthetically appealing.

- Comment: *Where will mechanical equipment be located? Any mechanical equipment located outside should be screened.* **Response: All mechanical equipment for the Smart Growth buildings is located in an enclosed, screened space, either in a closet accessed off the unit balcony or in the underground parking garage.**
- Comment: *What materials are proposed for the buildings?* **Response: A variety of exterior materials are proposed for the Smart Growth building, such as low maintenance clapboard vinyl siding, vinyl shakes, stone, and Azek trim boards and panels.**
- Comment: *Are any sustainable design elements proposed with this project (GSGD Section 4.11.9.1.5)? Further details on sustainability should be provided regarding use of rain gardens or other BMP's. A written recycling plan should be provided for the development. How will the development be managed in a way that maximizes recycling by the residents? A centralized recycling center raises questions as to convenience for the residents who are required to use one location to dispose of recyclables. Presumably, this involves placing recyclables in one's vehicle and driving it to the recycle center. Is this the best approach? How has this been handled in other developments? The recycle center is quite a distance away from the townhomes, How is trash removed from the*

townhomes? **Response:** Rain Gardens as requested are now provided throughout the site and are detailed on the updated site plans enclosed with this letter.

As detailed in our submission to Massachusetts Environmental Protection Agency, a number of substantial sustainable design elements have been proposed for this project and include the following items,

- a. Underground parking areas resulting in a reduction of impervious area from the project site's existing condition
- b. Exterior lighting designed to reduce light pollution
- c. Utilization of existing and available public water and sewer infrastructure
- d. Construction of new homes in close proximity to the Reading MBTA Commuter rail station, local retail, and local business services
- e. Redeveloping an abandoned and underutilized previously developed site
- f. Incorporate recycling areas within each underground parking garage to allow for and encourage resident recycling
- g. Avoidance of wetland resource areas
- h. Comprehensive on-site storm water management design, water quality improvements, and storm water infiltration
- i. Comprehensive network of safe walking paths and sidewalks throughout the project site
- j. Demolition of existing blighted commercial buildings including removal and proper disposal of any hazardous materials
- k. Consideration of a private shuttle van that would take Reading Woods residents to and from the local commuter rail station during peak commuter hours contingent upon desire and demand of the residents. The implementation of the shuttle van would occur based upon sufficient demand by the residents.
- l. Designation of a transportation coordinator who will develop and implement an information program that includes posting and distribution of ridesharing/transit schedules. The transportation manager will also facilitate a partnership with MassRides which provides programs and services to interested residents
- m. Bicycle storage areas located throughout the community and within each underground building parking area.
- n. New North American native drought tolerant tree plantings
- o. Significant existing tree preservation areas
- p. Properly designed irrigation system including rain sensors
- q. Building of Energy Star Rated Homes which include the following features:

- i. **Effective Insulation installed to Tier 1 and Tier 2 standards**
- ii. **Low E - Energy Efficient Windows which incorporate window glazing**
- iii. **Conduct inspection and comprehensive air sealing of building envelope to minimize air leakage**
- iv. **Seal and leak check all supply air ductwork**
- v. **Proper sized energy efficient heating, cooling, and ventilation equipment**
- vi. **Energy Star Qualified Appliances**
- vii. **Energy Star Qualified Lighting at a minimum of 80% CFL lighting**
- viii. **High efficiency tankless water heaters**
- ix. **Third Party Verification by a certified Home Energy Star Rater who conducts on-site testing and inspections to verify energy efficiency measures**
- x. **Use of low-volatile organic compounds (VOC) paints**
- xi. **Construction cardboard material recycling**
- xii. **Use of building materials with recycled content such as oriented strand board (OSB)**
- xiii. **Resource efficient designs using engineered wood products with advanced framing techniques such as open web floor trusses, PSL posts, LSL beams, LPI floor joists.**
- xiv. **Low-flow faucets in bathrooms and kitchen**
- xv. **Low flow showerheads and toilets in bathrooms**
- xvi. **Energy efficient dishwasher**

In response to the comments above, the recycling plan for Reading Woods has been revised. All garden buildings will now include a recycling area located within the enclosed underground parking garage. Separate recycling totes will be provided and will be clearly labeled. Information will be provided to residents and posted at the clubhouse to encourage recycling. We agree with the comments and believe that providing multiple locations in close proximity to the residents, in each building's parking garage will maximize use of the recycling program. Recycling will be encouraged of all residents.

Trash receptacles will be provided for each townhome and will be collected from their driveways, expected to be once a week. Trash totes will be stored inside the townhomes garages on days trash is not to be collected.

- **Comment: *Will the road ways (Jacob Way & Leah Way) be one or two way?* Response: All roadways within the Reading Woods development are proposed as two way with**

one exception. The roundabout in the middle of the development is designed and will be “signed” as one way (counter-clockwise).

- Comment: *The landscaping plan (sheet L-1) shows proposed trees but it is not clear which existing trees are to be removed.* **Response: Sheets 5 and 6, Demolition Plan, of the updated site plans designate which trees throughout the site are to be removed.**
- Comment: *Are new fences proposed with this development?* **Response: New 6’ high cedar privacy fence is proposed along a majority of the property line adjacent to Route 128. Additional 6’ cedar privacy fencing is located along portions of the property line adjacent to Curtis Street and South Street. Fencing locations and type are detailed on the updated set of site plans and will be discussed at the next CPDC meeting.**
- Comment: *All lighting should be fully shielded especially since this is a residential area. The Type A & Type C wall fixtures are a concern.* **Response: The Type A and C light fixtures have been revised. The modified fully shielded fixtures are detailed on the updated site lighting plan, sheet L8 of 8, enclosed with this letter.**
- Comment: *What will this development look like from I-93, I-95 or Main Street? Is the applicant able to provide a visual of what the development will look like from these different angles.* **Response: We believe the birds eye perspective prepared for the 1st CPDC meeting from above route 128 best shows what the development will look like. We don’t believe you will be able to see the development from either I-93 or Main Street due to topography.**
- Comment: *Affordable housing units - This proposal includes 40 affordable units in the GSGD. The Town would like to see at least 43 total affordable units with the development of this site so that the total affordable units would reach 10%.* **Response: The Applicant is considering the viability of providing 3 extra affordable units. We should be able to render our decision by the final CPDC meeting.**
- Comment: *Are the applicant’s Waltham and Natick developments similar to this proposal? Can the applicant provide photographs of their other developments?* **Response: The Waltham and Natick developments have a lot of similarities to our Reading Woods proposal. Several pictures are enclosed as Exhibit 2. As mentioned at the previous meetings, we are happy to accompany any Commission or Staff Member on a tour of either facility.**
- Comment: *The building massing and overall appearance seem too large as proposed; more variety in the roof lines and dormers is encouraged.* **Response: As mentioned above, the Smart Growth building is of high quality design and includes many**

architectural features to comply with all GSGD design standards. The buildings propose a variety of building materials such as stone, vinyl shakes, and vinyl clapboard siding that serves to maintain distinction between upper and lower floors. Projecting bays, decorative columns, roof gables, varied exterior wall planes, and recessed balconies are designed to make the buildings appear less massive. Azek trim board window heads, window mullions, Fypon louvers are also included to further enhance the the buildings' aesthetic appeal.

- *Comment: Currently, all units are proposed to be owner-occupied, is there the possibility that they could be converted to apartments? What is the estimated time-frame to build out and sell all the units?* **Response:** In order for the condominium to be converted to apartments, all 424 unit owners who own a percentage interest in the Reading Woods condominium would need to agree to the change. It is difficult to envision a scenario whereby all of the owners would unanimously agree to sell all of their units simultaneously. The chance of this happening is very unlikely, at best.

As detailed in our initial application, land development and demolition of all abandoned existing on-site buildings is expected to commence during the spring season of 2011 upon receipt of all applicable permits and approvals. We anticipate starting vertical construction in the summer of 2011. The 1st building currently proposed to be constructed is building #9 located in GSGD, sub-district C as shown on the site plans enclosed with this application. Sub-district C is the first sub-district to be constructed. We expect to complete and occupy all units within sub-district C by the end of year 2015. We expect to construct the townhomes and the community center within Sub-district A simultaneously with Sub-district C during years 2011 - 2013. Sub-district B is expected to be constructed and occupied next during the years 2015 and 2016. Sub-district D is the last sub-district to be constructed and occupied which we expect to commence in 2016 and complete by end of 2018. We expect to complete the entire Reading Woods residential condominium community with all units built, sold, and occupied by the end of year 2018, or sooner if possible.

- *Comment: The façades of the building where the garages are located lack visual interest.* **Response:** The side façade for the Smart Growth building has been modified and is enclosed as Exhibit 3. Our architects added two additional peaks to further break up the roof line and add more visual interest. Several windows were added, enlarged, and rearranged to provide a much more appealing side façade. The modified façade is applicable to both sides (the side with and without the underground garage entrance) of the Smart Growth building.
- *Comment: What is the total lot coverage of the buildings, paved areas and landscaping?* **Response:** The site is comprised of 24.8 acres. 4 acres are to be covered by

buildings, 6.5 acres of pavement are proposed, and 14.3 acres will be vegetated areas. The Lot Coverage & Open Space calculations are as follows:

- Entire Reading Woods project site: 16% lot coverage & 42% open space
 - Sub-district C "GSGD": 17% lot coverage & 62% open space
 - Sub-district A,B,&D "Bus C": 16% lot coverage & 55% open space
-
- Comment: *The windows on the upper floors should not be wider than the windows on the first floor in accordance Section 4.11.9.1.3.4 of the GSGD. The windows on the upper floors of the 36 unit buildings appear to be wider than first floor windows.* **Response:** In general, the windows on the top floors are designed to be the same width as the 1st floor however there are some cases where bay windows, box windows, or double windows on top floors are wider than double single windows on the 1st floor, in order to provide a more varied and less monotonous exterior elevation. Therefore, a waiver request of Section 4.11.9.1.3.4 of the GSGD to approve the 50 unit building architecture as submitted is attached in a letter to the CPDC, enclosed as Exhibit 4.
 - Comment: *Pedestrian paths should be rearranged or additional paths incorporated in areas where there is a circuitous connection to the green spaces such as building 8 and the age restricted buildings.* **Response:** A walk was considered in this area but was abandoned based upon the grade of the walk exceeding handicap slope requirements.
 - Comment: *According to GSGD Section 4.11.9.5.8, large parking areas should be landscaped to minimize visibility from traveled ways and from outside the district. Parking areas with 50-200 spaces shall have 5% of the area landscaped; lots over 200 spaces shall have 7% of the total area landscaped, what are the calculations and where are the landscaped areas with this proposal?* **Response:** For landscaped area locations and calculations, see the GSGD Parking Area Landscape % Sketch enclosed as Exhibit 5. 19% of the GSGD parking area is landscaped, in compliance with GSGD Section 4.11.9.5.8.
 - Comment: *How does the village green meet the requirement under GSGD Section 4.11.9.7.3 that it be located at a vehicular intersection in the Project? Can building 9 be relocated so that the village green is visible when visitors enter the property from Jacob Way?* **Response:** The Village Green as proposed begins at the intersection of Jacob Way and Leah Way. As such, we believe that we have met this requirement. However, in order to be conservative in interpretation, , a waiver request to approve the Village Green location as proposed is requested in a letter to the CPDC, enclosed as Exhibit 4. Building 9 cannot be moved down due to the close proximity of Jacob Way,

Building 8, the Building 8 parking area and the ensuing negative ripple effect moving it all down would cause.

- *Comment: Do drainage and flood control measures meet the Mass DEP Best Management Practices in the no build area in the northwest portion of the site?*
Response: Yes, we have avoided proposing any development in the watershed to the depression located in the northwest corner of the site. Since we have avoided doing any work in this no build area, we are meeting all the performance standards required of us by MADEP and standard engineering practice with regards to this area of the site.
- *Comment: Staff and the CPDC need to further review the fiscal impact report.* **Response: Responses to fiscal comments are included with this submission package**

Public Hearing follow up email of 1/27/11 from Ms. Abby McCabe

- *Comment: Specifics on sustainability (rain gardens?)* **Response: Specifics on sustainable design elements included in our Reading Woods proposal and the inclusion of rain gardens detailed on the updated site plans enclosed with this letter are discussed above.**
- *Comment: Buffers & vegetation – a major theme at Monday’s meeting was the details of the buffers around the property in terms of what trees, fences etc are actually being proposed and what it will look like.* **Response: Details of buffers around the property are detailed on the updated site plans and have been further revised based on supplemental meetings with some abutters. We will be prepared to discuss the buffers in more detail at the upcoming CPDC meeting.**
- *Comment: Waivers from Sections 4.11.9.1.3.4 (upper floor windows), 4.11.9.7.3 (village green) will be needed. In a letter you should request a waiver from these Sections & any other sections necessary for the CPDC’s to consider issuing a waiver.* **Response: As discussed in more detail above, a waiver request letter to the CPDC is enclosed as Exhibit 4.**
- *Comment: Verify that the snow storage areas will not impact site lines and abutters as discussed on Monday night (near Jacob Way / South Street intersection).* **Response: Snow storage areas will not impact site lines and abutters. Designated snow storage areas are located outside of required site distance areas.**
- *Comment: Concerns about flooding into the abutting properties on South Street particularly near the “no build” wetland area in the northwest portion of the site. The CPDC would like to see some drainage improvements particularly in the area labeled E-*

3 on the drainage analysis. **Response:** We have avoided proposing any work in this northwest corner of the site. As discussed above, we are meeting all the performance standards required of us by MADEP and standard engineering practice with regards to this area of the site. Regardless, we have started discussions with the Town Engineer on a proposed drainage improvement idea.

- *Comment: Reduce the 30 foot turning radius shown on the site plans particularly where Jacob Way leads to the townhomes.* **Response: The radius has been reduced on the updated site plans as requested**
- *Comment: Change the South Street crosswalk as shown so that it is on the other side of the intersection closer to Main Street and add a crosswalk on Jacob Way since that is the more likely pedestrian path.* **Response: The South Street crosswalk location has been relocated and a crosswalk has been added on Jacob way and is detailed on the updated site plans.**
- *Comment: Any additional details about the club house since that was a major concern to abutters (square footage, hours, max capacity, fitness area, noise controls etc).* **Response: A clubhouse floor plan is enclosed as Exhibit 6. Information regarding size, square footage, max. capacity, fitness area is detailed on the floor plan. No hour limitations or noise controls are planned at this time. Should the need arise, controls can be employed at that time.**
- *Comment: Lighting wasn't discussed at the hearing but you may want to discuss your proposal in February because it will likely come up. Lighting comments were also included in the completeness / advisory memo. A photometric lighting plan should also be submitted.* **Response: Our response to the lighting comments is provided above. An updated photometric plan and updated lighting fixtures are detailed within the updated plan set on sheet L8 of 8.**
- *Comment: The peer review of the traffic study is attached to this email and may lead to additional comments and request such as the site lines at the Jacob Way/South Street intersection, the potential for backup on South Street in the eastbound lane at the Main Street light may block cars from turning into Reading Woods, & additional traffic mitigation including stop signs etc.* **Response: An updated Traffic Impact & Access Study and Response to Comments Report, dated 2/17/11, prepared by DJK is included with this submission package.**

Fire Department Review Letter dated 1/20/11

- *Comment 1: We request the fire hydrants located on the North West corner of the roadway serving the Town House units be moved to the North East corner of the*

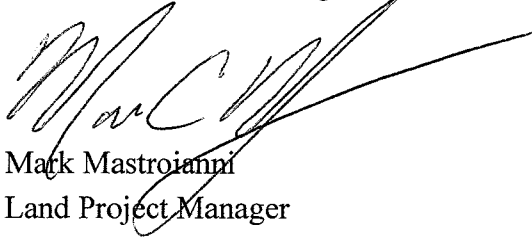
roadway. **Response:** Hydrants have been relocated on the updated set of site plans to satisfy the fire department.

- *Comment 2: We request the fire hydrant located in front of building 1 be moved to the North East corner of the intersection of Leah Way and Jacob Way.* **Response:** Hydrants have been relocated on the updated set of site plans to satisfy the fire department.
- *Comment 3: A Fire Protection Narrative Report must be submitted in compliance with the Commonwealth of Massachusetts Building Code 780 CMR 907.1.1.* **Response:** We ask that this report be submitted and coordinated with the fire department as part of the building permit process.
- *Comment 4: A Fire Protective Signaling System will be required to be installed in buildings 1 through 9 in compliance with 780 CMR 907 and N.F.P.A 72. In accordance with 780 CMR 907.14.3 the fire alarm system must be supervised by a central station service. The Reading Fire Department also requires buildings 1 through 9 to be monitored by a fire department master box. It is possible to configure the fire alarm system to have one master box monitor the system. The additional requirement of the master box is due to the size of the buildings and nature of the occupancy.* **Response:** We intend to cooperate and work with the Reading Fire Department to provide a fire protection system satisfactory to the Town. We ask that this item be finalized during the building permit process.
- *Comment 5: Key lock boxes are required to be installed at the entrance and garage\doors of buildings 1 through 9 at a location approved by the Reading Fire Department.* **Response:** A note that key lock boxes are to be provided has been added to the updated set of site plans.
- *Comment 6: The roadways must be posted with no parking signs and permission granted to the Reading Police Department to ticket vehicles in no parking areas.* **Response:** Additional no parking signs have been added to the updated site plans. Permission is hereby granted to the Reading Police Department to ticket vehicles as requested.

We thank you for your comments and look forward to continue working towards making Reading Woods a reality. We are happy to discuss any aspect of this submittal package at the upcoming CPDC meeting. Should you have any questions or comments, please let me know.

Sincerely,

Pulte Homes of New England, LLC

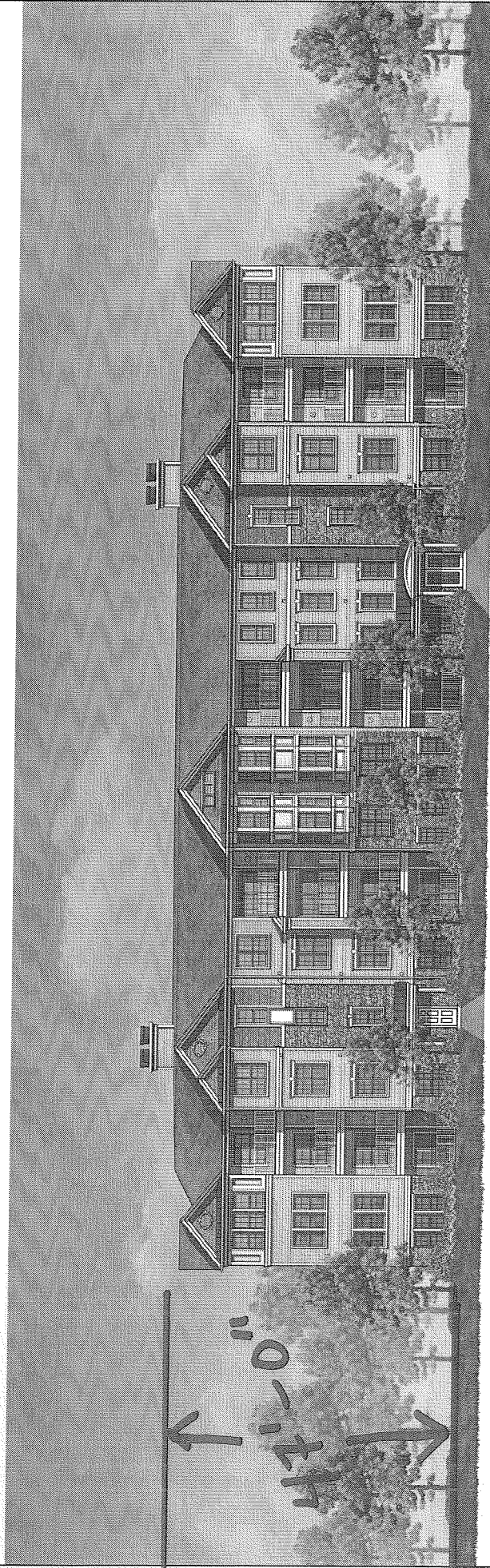
A handwritten signature in black ink, appearing to read 'Mark Mastroianni', with a long horizontal flourish extending to the right.

Mark Mastroianni

Land Project Manager

Cc: Michael Rosati, Marchionda & Associates
Reid Blute, Pulte Homes of New England

36 SENIOR HOUSING UNITS

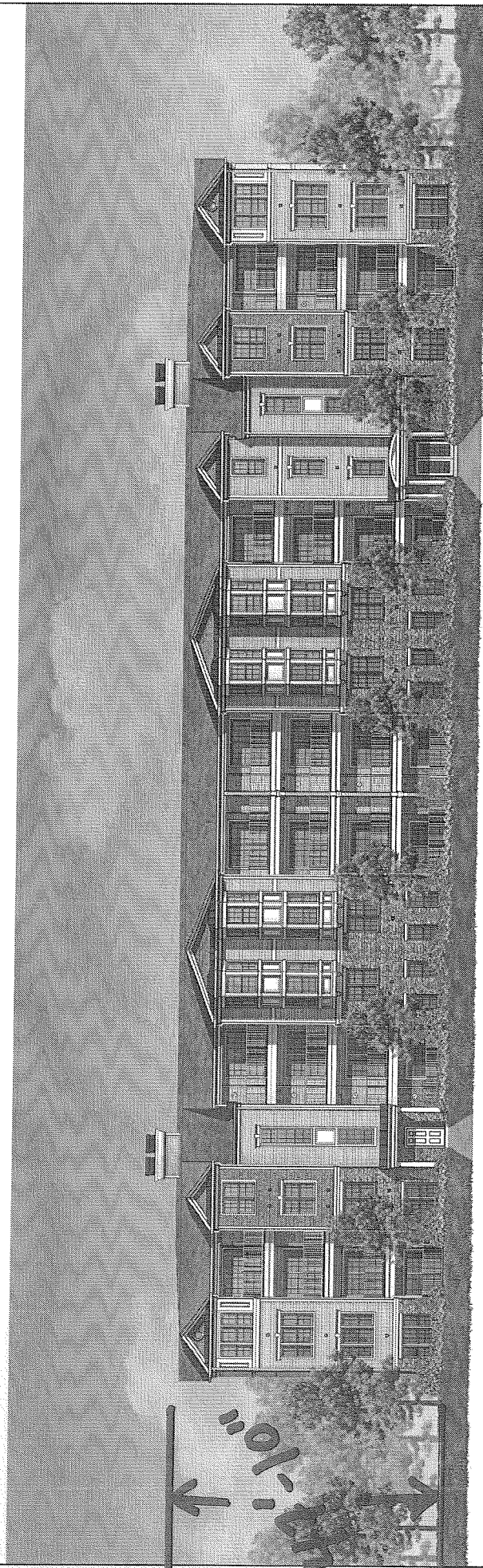


Reading Woods
Reading, Mass.



All floorplans and renderings are artist's conceptions and are not intended to be an actual depiction of the wall, windows, walks, driveways, landscaping, patios or decks.

50 SENIOR HOUSING & SMART GROWTH UNITS



Reading Woods
Reading, Mass.



All floorplans and renderings are artist's conceptions and are not intended to be an actual depiction of the wall, windows, walks, driveways, landscaping, patios or decks.

READING WOODS



FRONT ELEVATION

EXHIBIT 2 - PICTURES

WALTHAM (WELLINGTON CROSSING) AND NATICK (SOUTH NATICK HILLS)



Wellington Crossing, Waltham: Front Elevation



Wellington Crossing, Waltham: Rear Elevation



Wellington Crossing, Waltham: Unit balcony, Enclosed Mechanicals



Wellington Crossing, Waltham: Entrance to Underground Parking Garage



Wellington Crossing, Waltham: Community Clubhouse



South Natick Hills, Natick: 1st Building Under Construction



South Natick Hills, Natick: Front Elevation - Completed 1st Building



South Natick Hills, Natick: Front Elevation – Completed 1st Building

EXHIBIT 3: 50 UNIT BUILDING MODIFIED SIDE FACADE





Pulte Homes of New England, LLC
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Telephone: 508-870-9999
Fax: 508-870-0408

February 17, 2011

Community Development and Planning Commission
Town of Reading
Town Hall
16 Lowell Street
Reading, MA 01867

Re: GSGD waiver request
1 Jacob Way - Reading Woods

Dear Commissioners:

As response to comments, please accept this letter as our formal request to the CPDC to consider the following waivers as listed on Table 1 that may be needed for Reading Woods as currently proposed. Should the CPDC disagree with any of our design assumptions we respectfully ask the CPDC to grant the waiver.

We are happy to discuss these waiver requests further with the Commission at the upcoming meeting.

Sincerely,
Pulte Homes of New England, LLC

A handwritten signature in black ink, appearing to read "Mark Mastroianni", written over a horizontal line.

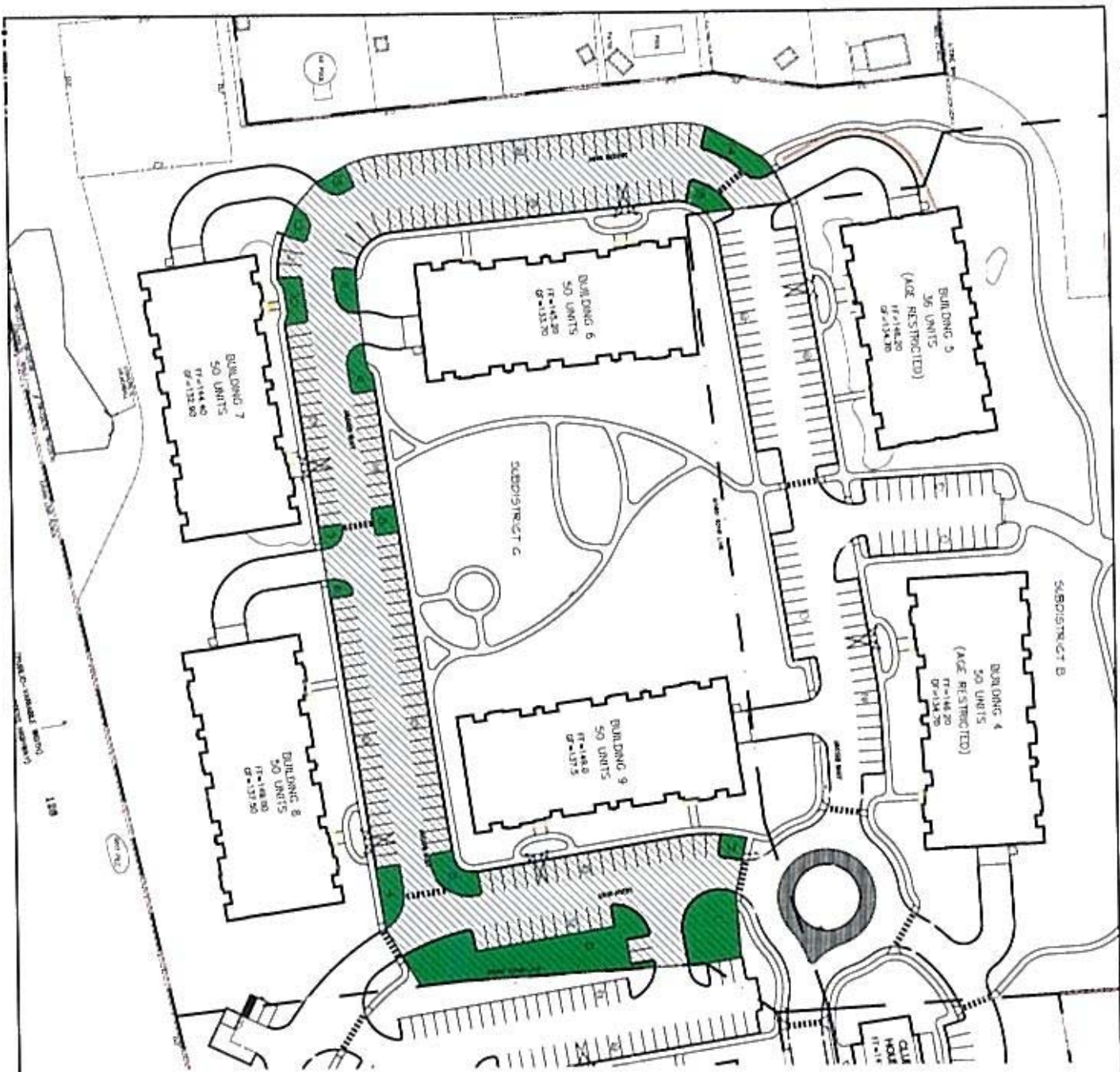
Mark Mastroianni
Land Project Manager

Cc: Michael Rosati, Marchionda & Associates
Reid Blute, Pulte Homes

TABLE 1

GSGD section	Requirement	Pulte Design Assumption	Waiver Request if deemed necessary by CPDC
4.11.9.1.3.4	Windows on top floors should not be wider than windows on the first floor	Four 50-unit buildings are proposed within the GSGD. In general, the windows on the top floors are designed to be the same width as the 1 st floor however there are some cases where bay windows, box windows, or double windows on top floors are wider than double single windows on the 1 st floor.	A waiver is hereby requested should the Commission determine that the 50 unit building architecture as submitted not meet this requirement
4.11.9.1.3.5	Windows on the top and bottom floors should generally align vertically	Four 50-unit buildings are proposed within the GSGD. In general, the windows on the top and bottom floors do align vertically however there are some cases where the upper floor have double windows and bay windows whereas the 1 st floor has two single windows.	A waiver is hereby requested should the Commission determine that the 50 unit building architecture as submitted not meet this requirement
4.11.9.2.2	4.11.9.2.2.1 - Circulation Roads shall be a maximum of 26 feet wide for a two-way road and may allow for parallel parking, and shall have granite curbing or edging 4.11.9.2.2.2 - Driveways serving parking areas should be a maximum of 24 feet wide for a two-way driveway and may have access to perpendicular parking	In order to provide a site plan which maximizes green space, provides a large village green which preserves significant specimen trees, and reduces impervious cover, the private roads within the GSGD that pass in front of buildings 6, 7, 8, & 9 have been designed and are intended to be driveways serving parking areas.	A waiver is hereby requested should the Commission determine that the private roads within the GSGD are not driveways serving parking areas.
4.11.9.12.1	Buffer from adjacent existing residential development. No building shall be located within one hundred (100) feet of a Single Family Residential District.	In order to properly align the intersection of Jacob Way and South Street the proposed welcome center is located approximately 65 feet from the adjacent residential zone.	A waiver is hereby requested to allow the construction of the welcome center within 100 feet of a residential zone.
4.11.9.7.3	The Village Green shall be located at a vehicular intersection in the project, and shall be pedestrian accessible from two or more sides. Where practical buildings and uses may front on the Village Green.	The Village Green as proposed begins at the intersection of Jacob Way and Leah Way.	A waiver is hereby requested should the Commission determine that the location of the Village Green as proposed is not in conformance with GSGD section 4.11.9.7.3

EXHIBIT 5: GSGD PARKING AREA LANDSCAPE 0%

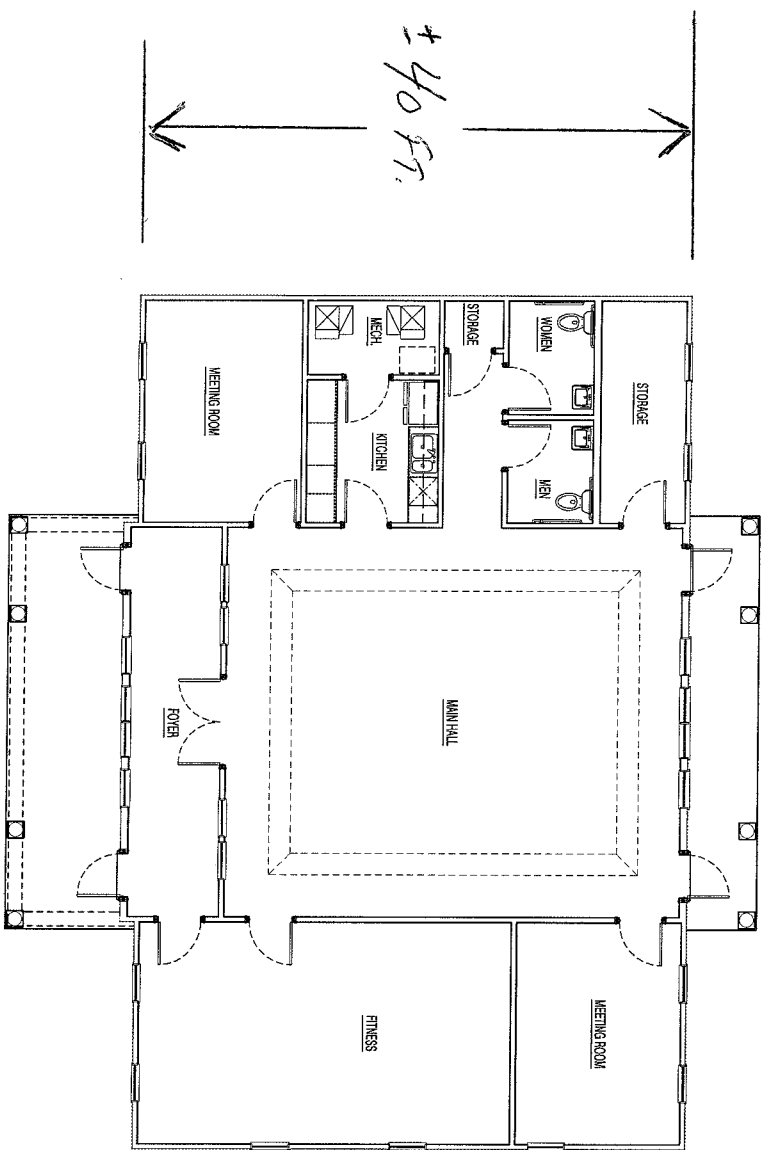


PARKING LOT - % LANDSCAPE

19%

NO.	DESCRIPTION	AMOUNT	PERCENT	TOTAL
1	LANDSCAPE	19.00	19.00	19.00
2	PARKING LOT	81.00	81.00	81.00
3	LANDSCAPE	1.00	1.00	1.00
4	PARKING LOT	9.00	9.00	9.00
5	LANDSCAPE	1.00	1.00	1.00
6	PARKING LOT	9.00	9.00	9.00
7	LANDSCAPE	1.00	1.00	1.00
8	PARKING LOT	9.00	9.00	9.00
9	LANDSCAPE	1.00	1.00	1.00
10	PARKING LOT	9.00	9.00	9.00
11	LANDSCAPE	1.00	1.00	1.00
12	PARKING LOT	9.00	9.00	9.00
13	LANDSCAPE	1.00	1.00	1.00
14	PARKING LOT	9.00	9.00	9.00
15	LANDSCAPE	1.00	1.00	1.00
16	PARKING LOT	9.00	9.00	9.00
17	LANDSCAPE	1.00	1.00	1.00
18	PARKING LOT	9.00	9.00	9.00
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21	LANDSCAPE	1.00	1.00	1.00
22	PARKING LOT	9.00	9.00	9.00
23	LANDSCAPE	1.00	1.00	1.00
24	PARKING LOT	9.00	9.00	9.00
25	LANDSCAPE	1.00	1.00	1.00
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30	PARKING LOT	9.00	9.00	9.00
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32	PARKING LOT	9.00	9.00	9.00
33	LANDSCAPE	1.00	1.00	1.00
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36	PARKING LOT	9.00	9.00	9.00
37	LANDSCAPE	1.00	1.00	1.00
38	PARKING LOT	9.00	9.00	9.00
39	LANDSCAPE	1.00	1.00	1.00
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47	LANDSCAPE	1.00	1.00	1.00
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61	LANDSCAPE	1.00	1.00	1.00
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64	PARKING LOT	9.00	9.00	9.00
65	LANDSCAPE	1.00	1.00	1.00
66	PARKING LOT	9.00	9.00	9.00
67	LANDSCAPE	1.00	1.00	1.00
68	PARKING LOT	9.00	9.00	9.00
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70	PARKING LOT	9.00	9.00	9.00
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73	LANDSCAPE	1.00	1.00	1.00
74	PARKING LOT	9.00	9.00	9.00
75	LANDSCAPE	1.00	1.00	1.00
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77	LANDSCAPE	1.00	1.00	1.00
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81	LANDSCAPE	1.00	1.00	1.00
82	PARKING LOT	9.00	9.00	9.00
83	LANDSCAPE	1.00	1.00	1.00
84	PARKING LOT	9.00	9.00	9.00
85	LANDSCAPE	1.00	1.00	1.00
86	PARKING LOT	9.00	9.00	9.00
87	LANDSCAPE	1.00	1.00	1.00
88	PARKING LOT	9.00	9.00	9.00
89	LANDSCAPE	1.00	1.00	1.00
90	PARKING LOT	9.00	9.00	9.00
91	LANDSCAPE	1.00	1.00	1.00
92	PARKING LOT	9.00	9.00	9.00
93	LANDSCAPE	1.00	1.00	1.00
94	PARKING LOT	9.00	9.00	9.00
95	LANDSCAPE	1.00	1.00	1.00
96	PARKING LOT	9.00	9.00	9.00
97	LANDSCAPE	1.00	1.00	1.00
98	PARKING LOT	9.00	9.00	9.00
99	LANDSCAPE	1.00	1.00	1.00
100	PARKING LOT	9.00	9.00	9.00

Marchionda 625 Westford Avenue Westford, MA 01886 TEL: (978) 435-4121 FAX: (978) 435-4122 WWW.MARCHIONDA.COM	READING WOODS READING, MA Prepared For PULTE HOMES OF NEW ENGLAND, L.L.C. 115 FLANKERS ROAD WESTFORD, MA 01881	HI HERRING ASSOCIATES, INC. 22 Middlebury Lane Westford, MA 01886 TEL: (978) 435-4121	APPROVED BY THE TOWN OF READING PLANNING BOARD DATE: _____	REGISTRY USE ONLY
	SHEET 14 OF 14	DATE: 10/10/08	SCALE: 1/8" = 1'-0"	DRAWN BY: _____

$$\text{MAXIMUM CAPACITY} = \pm 90 \text{ OCCUPANTS}$$


FLOOR PLAN
SCALE: 1/4" = 1'-0"

INTERIOR PARTITION TYPES	
TYPE	ASSEMBLY DESCRIPTION
1A	2 x 4 STUDS @ 24" OC. W/ 1/2" GYPSUM BOARD
1B	2 x 4 STUDS @ 24" OC. W/ 5/8" FIRE CODE GYPSUM BOARD
2A	PER U.L. LISTING NO. 10059
2B	2 x 4 STUDS @ 24" OC. W/ 1/2" GYPSUM BOARD (PROVIDE 50% REDUCTION IN EXPOSURE RATIO)
2C	2 x 4 STUDS @ 24" OC. W/ 5/8" FIRE CODE GYPSUM BOARD PER U.L. LISTING NO. 10059

- SPECIAL NOTES:**
1. ALL COOL DRAPES SHALL HAVE SAME COLOR HEADING AS DRAPES W/ 0000 U/LA.
 2. ALL CLOTHES SHALL BE 12" X U/LA.
 3. ALL CLOTHES SHALL BE 12" X U/LA.
 4. ALL IN THE WINDOW SHALL BE 6'-0" X 4'-0" U/LA.
 5. ALL CLOTHES 0' 6" X U/LA.
 6. ALL CLOTHES SHALL BE 12" X U/LA.
 7. PROVIDE HEADING 1" X 12" U/LA.
 8. ALL CLOTHES SHALL BE 12" X U/LA.
 9. ALL CLOTHES SHALL BE 12" X U/LA.
 10. ALL CLOTHES SHALL BE 12" X U/LA.
 11. COORDINATION TO PROVIDE AND INSTALL HARD FOLD TRAP ENCLOSURES FOR THE CLOTHES TO BE COORDINATED TO PROVIDE THE PANELS HAVE INTERIOR DOORS IN 12" X 12" U/LA.

NOTE: SCALES NOTED ON DRAWINGS RELATE TO FULL SIZE PLOTS ON 24x36 SHEETS

UNIT A-2	OCCUPANCY PROXIMATE	FIRST FLOOR PLAN	READING WOODS 2100 CLUBHOUSE FIRST FLOOR PLAN		NORTHEAST AREA 10600 ARROWHEAD DRIVE FAIRFAX, VIRGINIA 22030
	CONSTRUCTION AND READING WOODS COMMENTS:	COMMENTS:	COMMENTS:		

*Traffic Impact &
Access Study and
Response to
Comments*

*Reading Woods
Reading, Massachusetts*

*Proponent
Pulte Homes of N. E.
Westborough, MA*

DJK Dermot J. Kelly Associates, Inc.
Traffic Engineering/Transportation Planning

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TRAFFIC IMPACT AND ACCESS STUDY
AND
RESPONSE TO COMMENTS

READING WOODS

Reading, Massachusetts

Proponent

Pulte Homes of New England
Westborough, MA

February 17, 2011

Prepared by

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EXECUTIVE SUMMARY

Dermot J. Kelly Associates, Inc. (DJK) has conducted a Traffic Impact and Access Study (TIAS) for the proposed redevelopment of the former Addison-Wesley site located at the end of Jacob Way west of the Route 128 (I-95)/Main Street (Route 28) interchange in Reading, Massachusetts. The site abuts Route 128 and the southbound on-ramp to the east and south and a residential neighborhood to the north and west. The proposed redevelopment project includes the construction of 424 residential condominiums of which 208 units will be constructed for qualified residents that are 55 years or older with the remaining 216 units unrestricted. The project also involves the demolition of 208,000 square feet of commercial office space.

This report identifies existing traffic operation parameters on the adjacent roadway system, evaluates the anticipated traffic volume increases as a result of the proposed project, and analyzes the site-generated traffic-related impacts.

Access to and egress from the site would occur via Jacob Way, which intersects with South Street immediately west of the existing signalized intersection located at Main Street and South Street. The existing Jacob Way would be upgraded and improved with one lane approaching South Street and one lane entering the site.

STUDY AREA

The study area encompasses Jacob Way and the following selected intersections:

- Jacob Way at Main Street,
- Main Street at South Street,
- Main Street at Hopkins Street,
- Main Street at Summer Street,
- West Street at South Street and
- Main Street at Route 128 Southbound Off Ramp.

EXISTING TRAFFIC VOLUME CONDITIONS

Analysis of the November 2010 weekday traffic counts indicates that an average of approximately 2,984 vpd (vehicles per day) traveled along South Street west of Main Street at the Jacob Way intersection. During the two peak travel demand periods, which generally occurred between 7 and 9 AM and between 4 and 6 PM an average of 330 and 305 vehicles per hour (vph) were observed along South Street during the weekday morning and evening peak hours, respectively. Along Main Street north of South Street, an average of 18,828 vpd were observed with an average of 1,447 vph observed during the morning peak hour and 1,372 vph observed during the evening peak hour.

ANALYSIS CONDITIONS

For the purposes of this report, the following alternatives were evaluated:

- *2010 Existing Conditions* - The existing conditions alternative was analyzed to establish 2010 baseline traffic volume conditions.
- *2015 No-Build Conditions* - The No-Build alternative was examined to establish the 2015 baseline traffic-volume conditions. The incremental impacts of the proposed project may be determined by making comparisons to the 2010 Existing and 2015 No Build Conditions. The No-Build alternative assumes that the project is not built.
- *2015 Build Conditions* - The Build alternative includes the redevelopment of the former Addison-Wesley site. The Build alternative is evaluated in this report and is compared to the No-Build analysis condition. The Build condition represents the increase in traffic from the previous condition to the proposed condition (i.e., the delta impact). The Build condition includes the construction of the proposed Redevelopment Project.

SITE-GENERATED TRAFFIC VOLUMES

Based on the ITE trip generation rates, a 424-unit residential condominium development project would generate approximately 2,260 vehicle-trips per day (vpd). This daily volume would be split evenly with 1,130 vehicle-trips entering and 1,130 vehicle-trips exiting the site over the course of the entire 24-hour day. More importantly, during the weekday morning peak hour, a 424-unit residential condominium development would conservatively generate a total of 164 vehicle-trips with 28 vehicle-trips entering and 136 vehicle-trips exiting the project site. Similarly, during the evening peak hour, it is anticipated that 197 vehicle-trips would be generated. The 197 vehicle-trips would consist of 132 vehicle-trips entering and 65 vehicle-trips exiting the development during the peak 60-minute period. The remaining vehicle-trips would occur over the course of the day.

ALTERNATIVE PROJECTS

Several alternative development projects have been considered for this site over the last several years. About two years ago, National Development developed plans for this site for 356 Residential Units plus 160,000 square feet of Office space. The current project consists of 424 Residential units and no office space. About one-half, 208 Residential units, would be age restricted to residents 55 years old and older. The current proposed project would generate 1,580 fewer vehicle-trips per day than the previous proposed project by National Development. Similarly, during the morning and evening peak hours, the current project would generate 236 and 223 fewer vehicle-trips per hour, respectively.

LEVEL OF SERVICE CAPACITY ANALYSIS

Signalized intersection Level of Service (LOS) capacity analysis was performed for the study area intersections. The capacity analysis is summarized below by location.

- *South Street at Jacob Way* - The left turns entering the Reading Woods development project at Jacob Way are projected to operate at LOS A during both the morning and evening peak hours with the project constructed and fully occupied. The exiting movements from Jacob Way onto South Street are projected to operate at LOS B.
- *Main Street at South Street* - The Main Street/South Street intersection currently operates at LOS B during both the morning and evening peak hours. It will continue to operate at LOS B during both the morning and evening peak hours under 2015 Build with development traffic volume conditions. With mitigation to address the queuing along South Street westbound the intersection will operate at LOS C during both the morning and evening peak hours under 2015 Build with development traffic volume conditions.
- *Main Street at Summer Street* - The Main Street/Summer Street intersection will operate at LOS B/A during the morning/evening peak hours under 2015 No Build traffic volume conditions and it will continue to operate at LOS B/A with the construction and occupancy of the proposed project.
- *Main Street at Hopkins Street* - The Hopkins Street eastbound and westbound approaches currently operate at LOS E/F during the morning peak hour and will continue to operate at a poor Level of Service under future conditions independent of the proposed project. Left turns from Main Street northbound to Hopkins Street currently operate at Level of Service A with no change anticipated with the construction of the proposed project.
- *South Street at West Street* - The South Street/West Street intersection currently operates at LOS D/C during the morning/evening peak hours and it will operate at LOS D/D under 2015 Build with development traffic volume conditions.
- *Main Street at Route 128 Southbound Off Ramp* - The right turns from the Route 128 Southbound Off Ramp currently operate at LOS B and this movement is projected to operate at LOS B/C under 2015 Build with development traffic volume conditions. It should be noted that the LOS does not account for the effect the Main Street blockage on the calculated delay for this movement.

MITIGATION MEASURES

The final phase of the analysis process is to identify the mitigation measures necessary to minimize the impact of the project on the adjacent transportation system. *The Proponent will implement all mitigation measures listed below subject to the Proponent receiving all necessary permits and approvals to construct such improvements as well as the proposed project:*

- It is suggested that the Jacob Way approach to South Street be relocated further to the west from its present location in order to:
 - increase the queuing capacity for the eastbound South Street approach to the signalized Main Street intersection,
 - to improve sight distance in both directions,
 - to create a 90 degree approach to the South Street intersection and
 - to create a signature type entrance to the Reading Woods residential development.

- It is suggested that Jacob Way be upgraded and improved to include two lanes, one lane for entering traffic and one lane for exiting traffic with a 5 foot sidewalk located along one side of the roadway. Each travel lane is suggested to be 13 feet in width. The Jacob Street approach to South Street is suggested to be placed under stop sign control with a painted stop bar and a double yellow centerline located within the first 35 feet of the Jacob Way approach. Similarly, the relocated driveway serving the attached office building is also suggested to be placed under stop sign control with a painted stop bar and a double yellow centerline located within the throat of the driveway approach.
- A painted crosswalk is suggested to be provided across South Street connecting the Jacob Way sidewalk with the sidewalk located along the north side of South Street.
- To enhance the overall sight distance at the relocated Jacob Way approach with South Street, it is recommended that roadside vegetation and topographic ground elevations adjacent to Jacob Way and along South Street frontage should be maintained such that sufficient safety sight lines are provided in both directions throughout the life of the project. This triangular area across the project parcel frontage should extend 20 feet back from the existing edge of the roadway (representing an existing vehicle) and extend 305 feet to the east and west along South Street representing approaching vehicles. It should be noted that the 20-foot distance into the Jacob Way exceeds the normal position of a driver's eye, which is generally 8 feet or less from the front of the vehicle. Furthermore, the 305 feet along South Street represents adequate sight distance for a design speed of 40 mph.
- It is suggested that a secondary, gated, fire/emergency access drive be provided from South Street to the site through a portion of the property that abuts South Street.
- It is suggested that the proponent designate an on-site Transportation Coordinator to facilitate a partnership with MassRIDES which provides programs and services to interested residents to encourage travel demand reduction measures. MassRIDES is a non-profit organization developed by the Massachusetts Executive Office of Transportation that provides carpool and vanpool matching services and other travel demand reduction measures.
- It is suggested that the project site be designed to accommodate pedestrians and bicycles. Pedestrian and bicycle suggested features to be included are as follows:
 - a bicycle rack at the Community Center and other appropriate locations;
 - pedestrian sidewalks along at least one side of each internal onsite roadway with internal crosswalks and pedestrian ramps such that pedestrian paths are continuous throughout the site and
 - a pedestrian trail along the perimeter of the residential building within an open space area linking with the internal pedestrian sidewalks with the sidewalk along South Street.
- Additional mitigation measures as discussed in the Response To Comment chapter includes:
 - modifications to the existing traffic signal phasing are suggested at the Main Street/South Street intersection;
 - it is suggested that the Jacob Way approach to South Street be relocated an additional 50 feet to the west;

- a "DO NOT BLOCK INTERSECTION" sign (MUTCD referenced R10-7) is suggested to be placed along South Street west of Jacob Way facing eastbound traffic;
- additional traffic control signs are suggested to be installed at the Hopkins Street/Main Street intersection;
- the proponent will make a \$10,000 contribution towards design plans for the Hopkins Street/Main Street intersection prior to occupancy of the 50th residential unit;
- the proponent will conduct a post development traffic analysis of the West Street/Summer Street intersection and modify the existing traffic signal timings if necessary and
- the proposed Site Development Plans graphically present a series of traffic control signage and pavement markings.

EXISTING CONDITIONS

FIELD SURVEY

A comprehensive field inventory of the adjacent roadway system was conducted during November 2010. The field inventory included collection of existing roadway geometrics, traffic volumes, and safety data for the roadways in the vicinity of the site.

Traffic volumes were measured by means of automatic traffic recorder (ATR) counts and substantiated by manual intersection turning-movement and vehicle-classification counts (TMC).

GEOMETRICS

- *South Street at Jacob Way* - Jacob Way approaches South Street from the southwest in a single lane and is under stop control. South Street is a two lane roadway running in an east-west direction. Generally, land use is residential to the east of the intersection and commercial to the west of the intersection. Jacob Way provides access to an adjacent office building and it formerly provided access to the Addison-Wesley office complex.
- *Main Street at South Street* - This intersection is a four legged, signalized intersection. Main Street consists of two lanes in each direction with Main Street traversing the Town of Reading in a north-south direction. South Street consists of single lane approaches from the east and west. Land use in the immediate area consists of highway commercial and retail uses.
- *Main Street at Summer Street* - This intersection is also a four legged, signalized intersection with Main Street operating as the 'major' approach. Summer Street is the "minor" approach and consists of a single lane approach. Land use in the immediate area consists of a gas station located in the southwest quadrant of the intersection and residential land uses located in the three other quadrants of the intersection.
- *Main Street at Hopkins Street* - This intersection is unsignalized with the eastbound approach restricted to right turns only. The Hopkins Street approaches consist of single lanes with Main Street consisting of two lanes in each direction. Land use in the area is generally commercial and retail uses.
- *South Street at West Street* - This intersection is a four legged, signalized intersection with West Street operating as the 'major' approach. Both approaches operate with one through/right turn

lane and an exclusive left turn lane. South Street is the “minor” approach and consists of a single lane approach. The fourth leg of the intersection serves the Archstone residential complex. Land use in the immediate area consists of residential land uses.

- *Main Street at Route 128 Southbound Off Ramp* - The Route 128 Southbound Off Ramp approaches the Main Street intersection in a single lane. Main Street northbound and southbound traffic is separated by a raised island and guard rail. At this intersection, Main Street northbound consists of two lanes.

TRAFFIC VOLUMES

Existing traffic volumes were recorded mechanically by automatic traffic recorders (ATR) and were substantiated by actual manual intersection turning movement counts (TMC). These traffic volumes were reviewed to determine average daily and peak-hour traffic volumes on the study area roadways. Table 1 summarizes the 2010 ATR traffic volume data collected along Main Street and South Street.

Analysis of the November 2010 ATR weekday traffic data indicates that an average of approximately 2,984 vpd (vehicles per day) traveled along South Street west the Main Street at the Jacob Way intersection. During the two peak travel demand periods, which generally occurred between 7 and 9 AM and between 4 and 6 PM, an average of 330 and 305 vehicles per hour (vph) were observed along South Street during the weekday morning and evening peak hours, respectively. Along Main Street north of South Street, an average of 18,828 vpd were observed with an average of 1,447 vph observed during the morning peak hour and 1,372 vph observed during the evening peak hour.

**TABLE 1
EXISTING TRAFFIC VOLUME SUMMARY**

Location/ Time Period	Daily Traffic (24 hour) (vpd) ^a	Peak Hour	Peak-Hour Traffic Volume (vph) ^b
<i>South Street West of Main Street:</i>			
Wednesday 11/3/10	3,050	7:15-8:15 AM 5:15-6:15 PM	321 320
Thursday 11/4/10	2,918	7:30-8:30 AM 4:45-5:45 PM	338 289
Average	2,984	Morning Evening	330 305
<hr/>			
<i>Main Street North of South Street:</i>			
Wednesday 11/3/10	19,090	7:15-8:15 AM 4:30-5:30 PM	1,462 1,409
Thursday 11/4/10	18,566	7:30-8:30 AM 5:00-6:00 PM	1,431 1,335
Average	18,828	Morning Evening	1,447 1,372

^a Vehicles per day.

^b Vehicles per hour.

Figure 1 and 2 graphically present the results of the TMC traffic volume inventory for the weekday morning and evening peak hours.

ACCIDENT HISTORY

To identify accident trends in the study area, the most recent three-year period of available data for the study area intersections were reviewed and summarized below in table 2. The data was obtained from the files of the Massachusetts Department of Transportation (MassDOT) for the years 2006 through 2008. The actual accident data is enclosed in the Appendix of this report.

As shown in Table 2, the number of accidents ranged from 2 accidents at the South Street/West Street intersection to 23 accidents at the Main Street/Hopkins Street intersection over the three-year study period. Accident crash rates for the study area three signalized intersections are below the District 4 average rates of 0.78 accidents per one million vehicles entering (MEV) the intersection. The accident rate for the Main Street/Hopkins Street unsignalized intersection is 0.79 accidents per MEV, which is above the statewide average of 0.58 accidents per MEV for unsignalized intersections.

Figure 1: 2010 Existing
Morning Peak Hour
Traffic Volumes

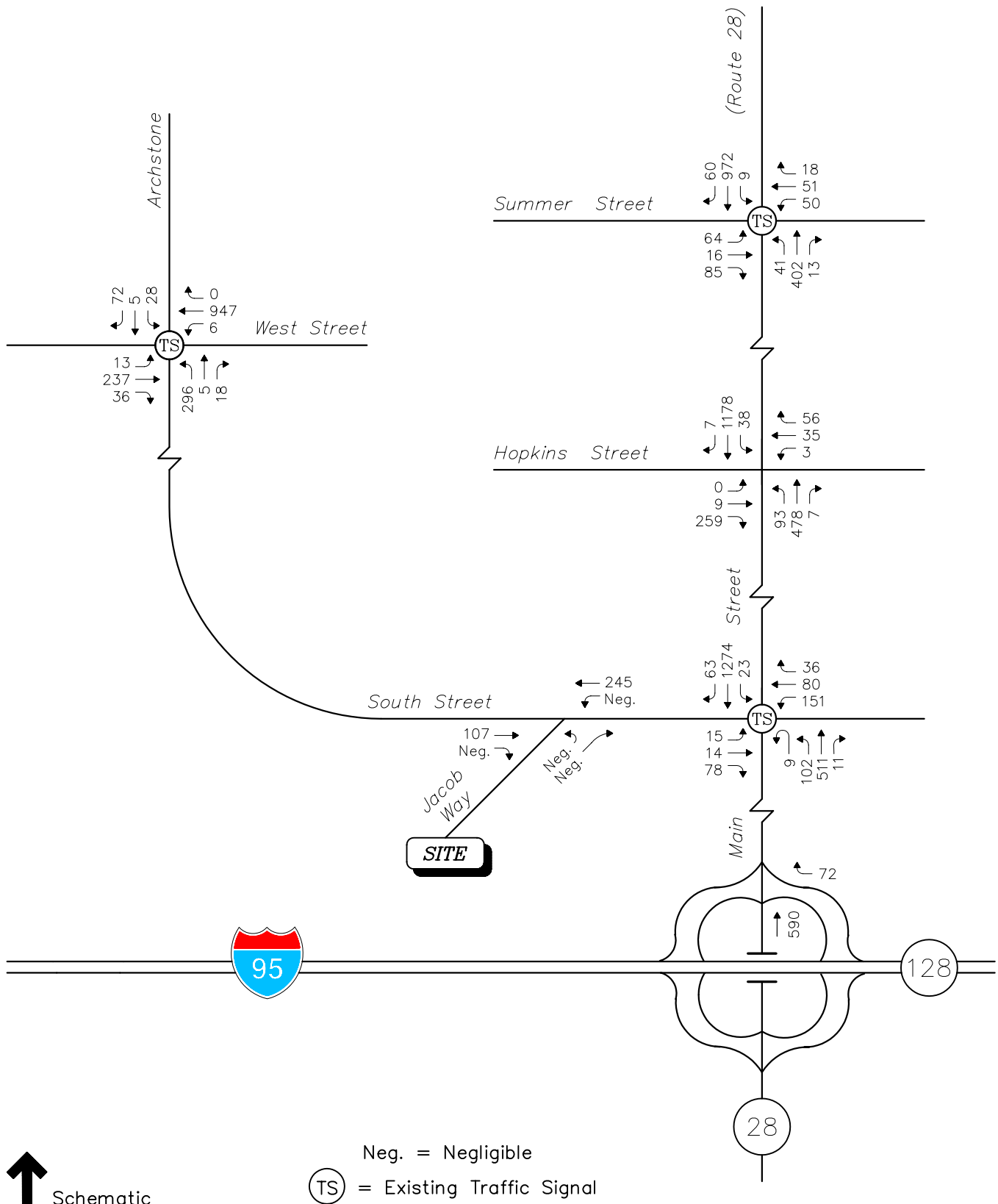


Figure 2: 2010 Existing
Evening Peak Hour
Traffic Volumes

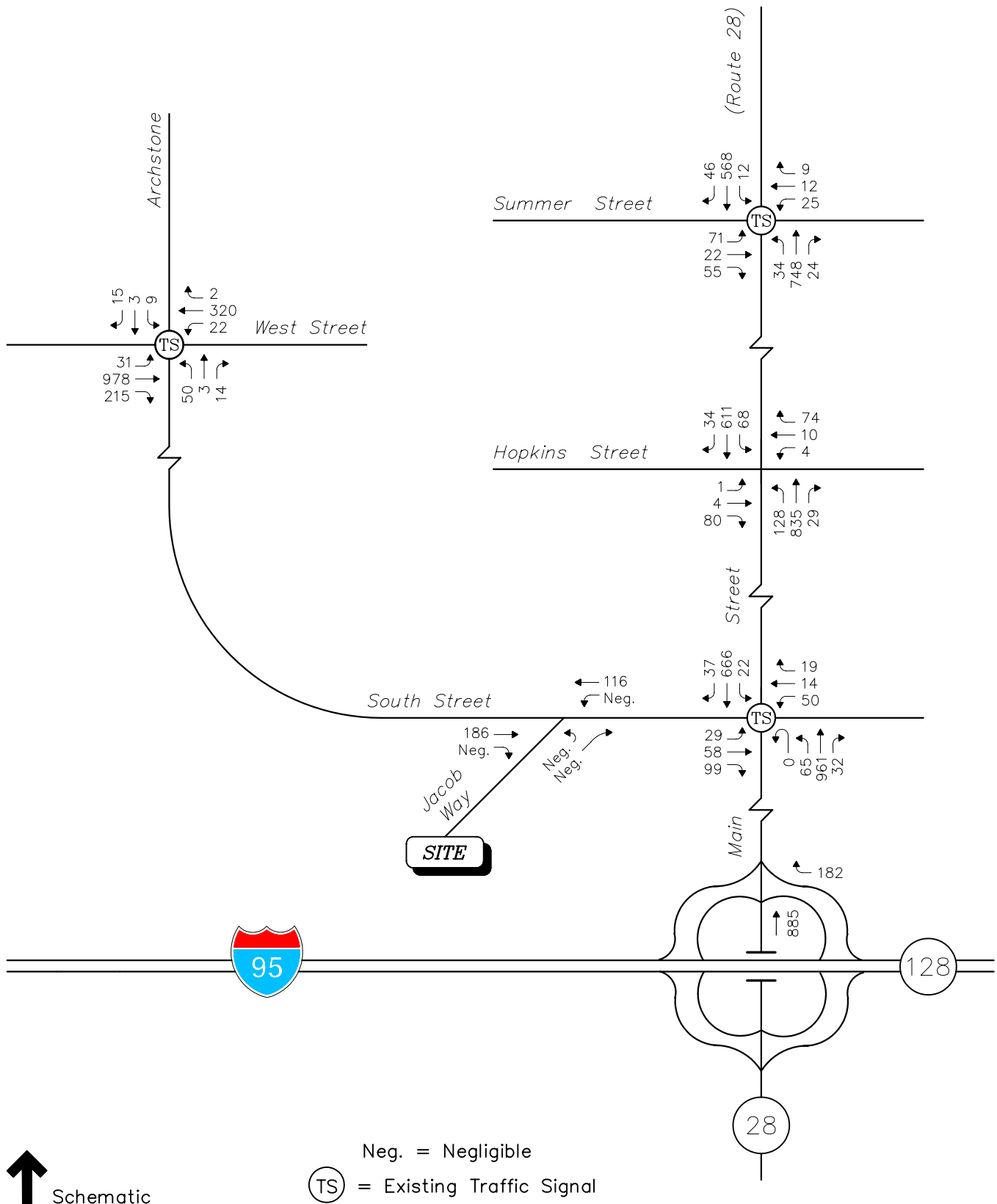


TABLE 2
INTERSECTION ACCIDENT SUMMARY^a
2006 through 2008

	Main Street at South Street	Main Street at Hopkins Street	Main Street at Summer Street	South Street at West Street
Severity				
Property Damage	13	16	12	2
Personal Injury	1	7	6	0
Not Reported	0	0	0	0
<u>Fatality</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	14	23	18	2
Type				
Angle	6	12	9	0
Rear-End	7	7	5	0
Single Vehicle	0	2	2	0
Head-on	0	1	2	0
Side swipe	1	0	0	2
<u>Not Reported/Other</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>0</u>
Total	14	23	18	2
Road Conditions				
Wet/Icy	0	3	3	0
Dry	13	20	15	2
<u>Not Reported</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	14	23	18	2
Time				
7-9 AM	1	4	1	0
4-6 PM	4	2	3	0
<u>Other</u>	<u>9</u>	<u>17</u>	<u>14</u>	<u>2</u>
Total	14	23	18	2
Year				
2006	6	8	6	1
2007	5	11	6	0
<u>2008</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>1</u>
Total	14	23	18	2
Average Number of Accidents/Year	4.67	7.66	6.00	0.67
Accident Crash Rate (MEV ^b)	0.44	0.79	0.73	0.08
MHD District 4 2010 Average Accident Rates	0.78	0.59	0.78	0.78

^a Source: Massachusetts Department of Transportation (MassDOT). Note: It was not possible to obtain accurate accidents data for the Main Street/Route 128 Southbound Off Ramp intersection due to the coding of accident information contained in the MassDOT accident data.

^b MEV = Million Entering Vehicles.

PUBLIC TRANSPORTATION

There are three nearby MBTA Commuter Rail Stations located less than three miles from the site. The Reading and Wakefield stations on the Haverhill line are located 1 & ½ and 2 miles from the site. The peak hour travel time to/from Boston on the Haverhill Line is 25 minutes to/from the Wakefield station and 30 minutes to/from the Reading station with headways between 20 and 30 minutes. The Reading station provides parking for 113 vehicles and the Wakefield station provides parking for 117 vehicles.

The Anderson/Woburn Station on the Lowell line is located approximately 2 & ½ miles from the site. Travel time is approximately 25 to 27 minutes and the rail line operates with headway of 15 to 20 minutes. The Anderson/Woburn station provides parking for approximately 2,000 vehicles. A commuter bus connection to Logan Airport is also available at the Anderson/Woburn station.

“THE RIDE”, the MBTA’s Paratransit program provides door-to-door service in the Town of Reading to eligible people who cannot use public transportation because of a disability. “THE RIDE” operates from 6AM to 1AM.

FUTURE TRAFFIC VOLUME CONDITIONS

INTRODUCTION

This section of the report determines the future traffic volume levels along the study area roadways and intersections. To determine the impact of site-generated traffic volumes on the roadway network under future conditions, the existing traffic volumes in the study area were projected to the year 2015 to be consistent with Massachusetts State Guidelines for Traffic Impact Assessments. Traffic volumes on the roadway network at that time would include all existing traffic, background traffic growth, and the site-generated traffic volumes.

BACKGROUND TRAFFIC GROWTH

Traffic growth on area roadways is a function of the expected land development in the immediate area as well as the surrounding region. Several methods can be used to estimate this growth. A procedure frequently employed is to identify the location and type of new developments planned to occur during the designated planning horizon, estimate the traffic to be generated and assign it to the area roadway network. This method usually produces a realistic estimate of growth for local traffic.

The Planning Office for the Town of Reading was consulted during the preparation of this Study to identify existing and projected development projects anticipated to occur by 2015. Based on this information and other background information, the 2010 Existing traffic volumes were increased to account for a retail/restaurant project located at the corner of Main and South Streets plus an additional +1.0 percent per year for five years to account for background traffic growth.

Figures 3 and 4 graphically present the 2015 No Build weekday morning and evening peak-hour traffic volumes.

Figure 3: 2015 No Build
Morning Peak Hour
Traffic Volumes

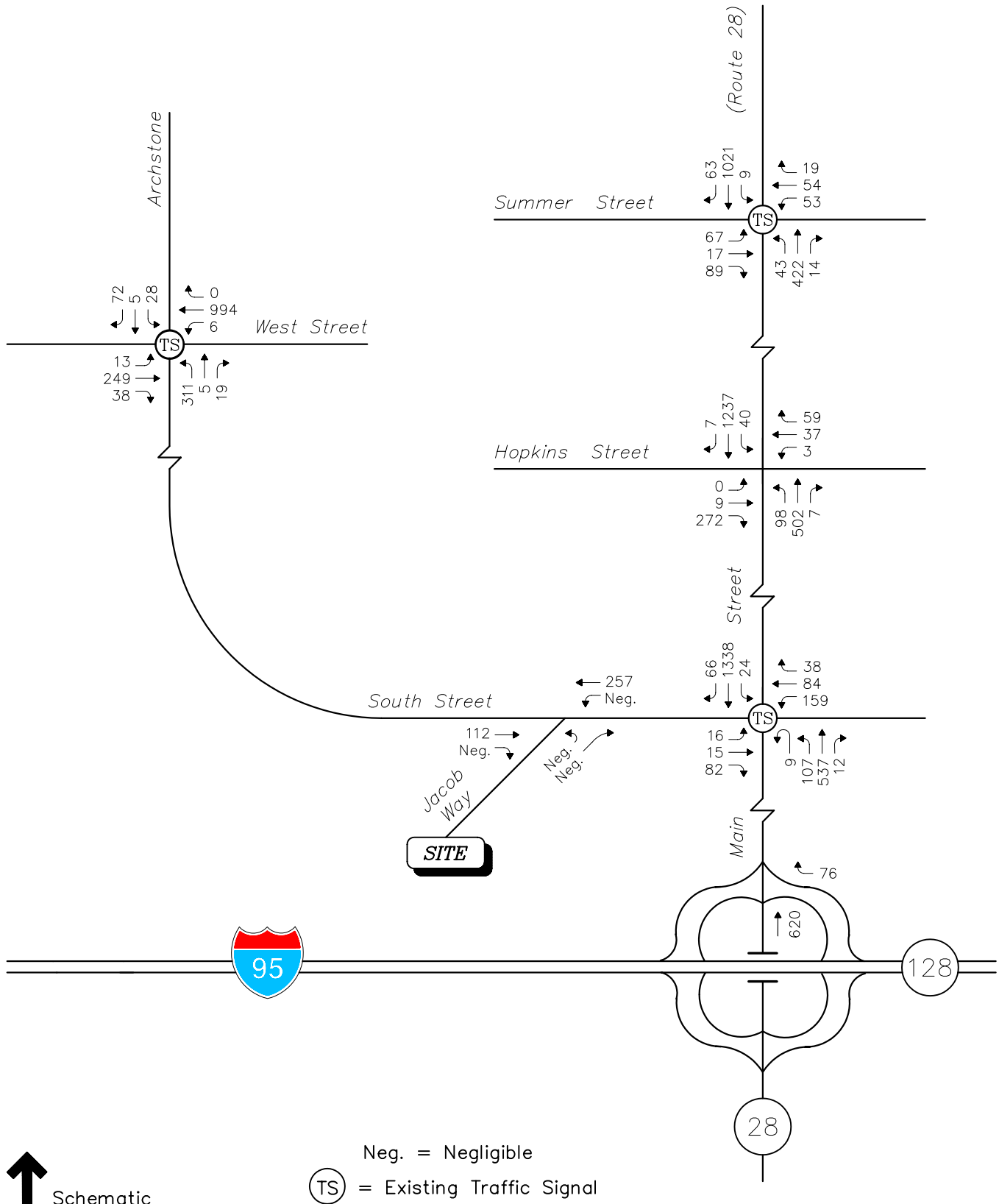
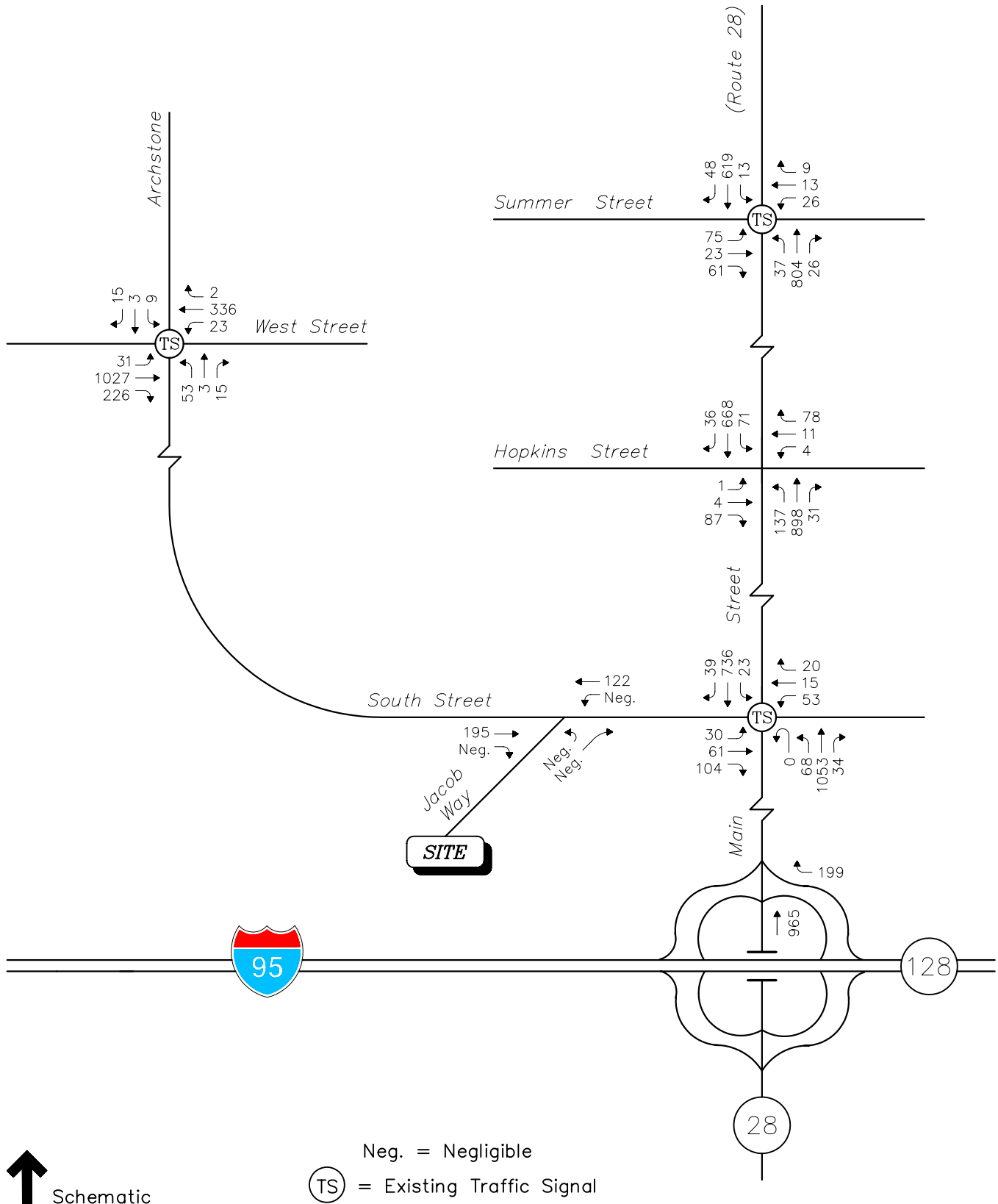


Figure 4: 2015 No Build
Evening Peak Hour
Traffic Volumes



VEHICLE-TRIP GENERATION

Traffic volumes expected to be generated by the proposed residential development project were determined by the trip rates published in the Eighth Edition (2008) of the Institute of Transportation Engineers (ITE) *Trip Generation Manual*. The ITE trip rates were also compared with actual trip rates from three other existing 55 and older residential development projects. Current project planning calls for the construction of up to 424 units of housing with 208 units dedicated for qualified 55-year-old and older residents and the reminding 216 units unrestricted. To determine the traffic expected to be generated by this project, ITE Land Use Code (LUC) 230 Residential Condominium trip generation rates were applied to the 216 unrestricted units and the actual 55 and older residential trips rates were applied to the 208 age restricted units. Table 6 provides a summary of trip generation characteristics based on both ITE trip rates and observed trip rates. To present a conservative analysis condition, the higher ITE trips rates were applied to all 424 Condominiums and those higher traffic volumes were used in all of the Level of Service Analysis.

TABLE 3
VEHICLE TRIP-GENERATION SUMMARY

Time Period/ Direction of Travel	<u>Actual Vehicle-Trip Generation</u>			<u>Vehicle-Trips Used For This Study</u>
	Vehicle-Trip Generation Based on ITE Residential Condominiums LUC #230 ^a (216 Units)	Vehicle-Trip Generation Based on Actual Observation at Existing 55 & Older Residential Development Projects ^b and (208 Units)	Total Vehicle-Trip Generation (424 Units)	Vehicle-Trip Generation Based on ITE Residential Condominiums LUC #230 ^a and (424 Units)
<i>Weekday Morning</i>				
<i>Peak Hour:</i>	16	25	41	28
Entering (vph) ^c	80	35	115	136
Exiting (vph)	96	60	156	164
Total (vph)				
<i>Weekday Evening</i>				
<i>Peak Hour:</i>				
Entering (vph)	76	47	123	132
Exiting (vph)	37	14	51	65
Total (vph)	113	61	174	197
<i>Average Weekday</i>				
Entering (vpd) ^d	629	362	991	1,130
Exiting (vpd)	629	362	991	1,130
Total (vpd)	1,258	724 ^e	1,982	2,260

^a LUC = Land Use Code. Source: Trip Rates from *Trip Generation*, Eighth Edition: Institute of Transportation Engineers (ITE), Washington, DC, 2008; LUC #230 Residential Condominium.

^b Source: Based on actual traffic counts conducted at The Village at Great Hill in Topsfield, Eagles Landing in Tewksbury, and Danford Village in Billerica.

^c Vehicle trips per hour.

^d Vehicle trips per day.

^e Based on the ratio of average peak hour to daily trip rates from ITE Rates for Residential Condominiums/Townhouses Land Use Code #230 and applied to the observed average peak hour trip rates.

Based on the higher ITE trip generation rates, a 424-unit residential condominium development project would generate approximately 2,260 vehicle-trips per day (vpd). This daily volume would be split evenly with 1,130 vehicle-trips entering and 1,130 vehicle-trips exiting the site over the course of the entire 24-hour day.

More importantly, during the weekday morning peak hour, a 424-unit residential condominium development would conservatively generate a total of 164 vehicle-trips with 28 vehicle-trips entering and 136 vehicle-trips exiting the project site. Similarly, during the evening peak hour, it is anticipated that 197 vehicle-trips would be generated. The 197 vehicle-trips would consist of 132 vehicle-trips entering and 65 vehicle-trips exiting the development during the peak 60-minute period. The remaining vehicle-trips would occur over the course of the day. These higher vehicle-trip estimates were used in all of the Level of Service analyses presented in this report.

TRAFFIC DISTRIBUTION/ASSIGNMENT

Directional distribution of peak hour generated trips to and from the proposed development is expected to predominantly follow the home-to-work and work-to-home patterns which, in turn, are a function of population densities and areas of employment. Accordingly, the directional split of the new trips originating from, or destined to, the development was based on the Town of Reading Journey-to-Work data from the 2000 census as presented in the *VHB Traffic Impact and Access Study for the Proposed Development of Addison-Wesley Site dated September 2007*. Trip-distribution patterns were developed specifically for this study and are summarized as follows:

○ Route 95/128 to/from the North	10%
○ Route 95/128 to/from the South	49%
○ Main Street to/from the North	15%
○ Main Street to/from the South	9%
○ South Street to/from the East	3%
○ South Street to/from the West	<u>14%</u>
TOTAL	100%

The site-generated traffic volumes were superimposed onto the 2015 No Build traffic volume networks based on the above traffic distribution patterns creating the 2015 Build traffic volume networks. Figures 5 and 6 graphically presents the 2015 Build weekday morning and evening peak-hour traffic volume networks.

Figure 5: 2015 Build
Morning Peak Hour
Traffic Volumes

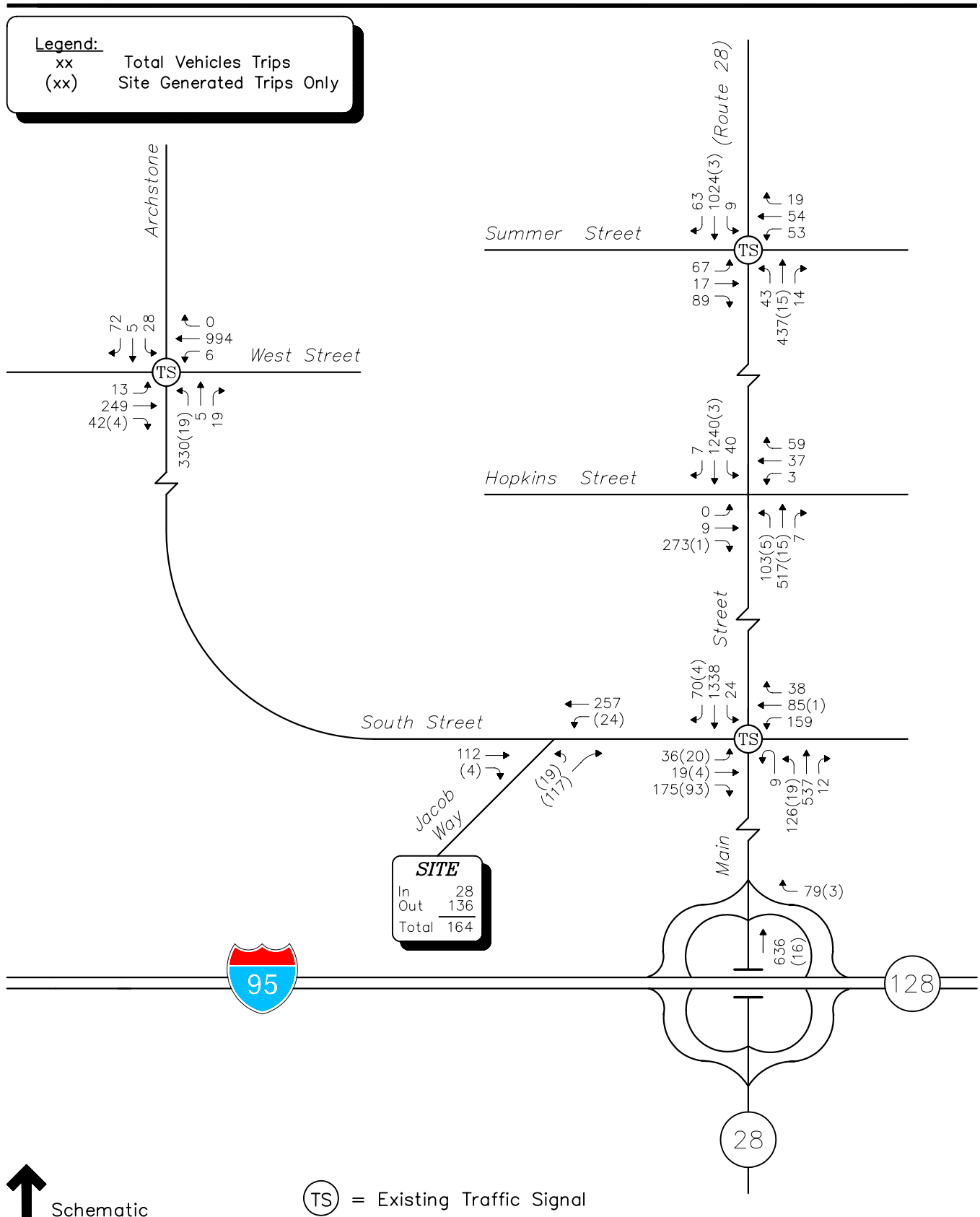
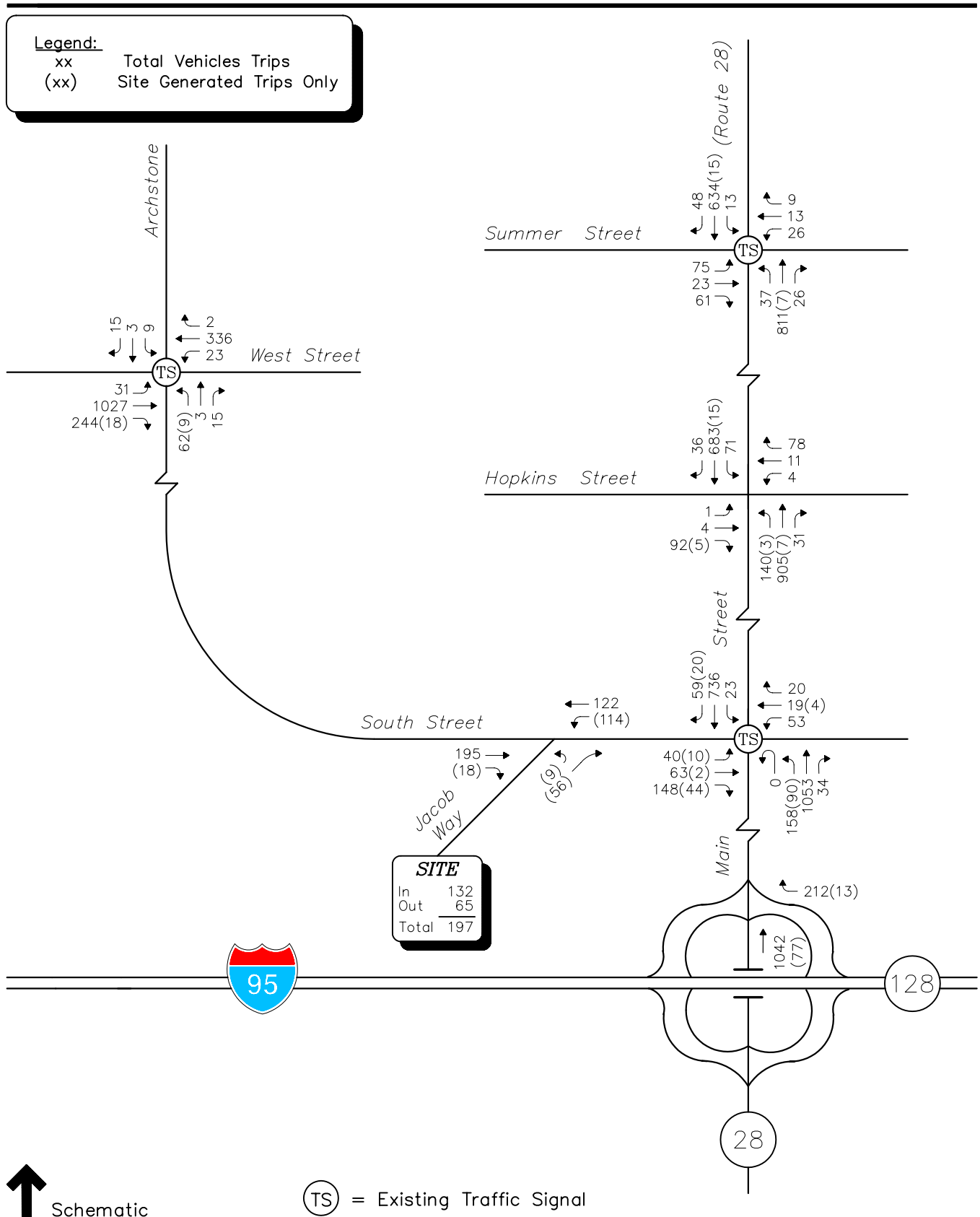


Figure 6: 2015 Build
Evening Peak Hour
Traffic Volumes



PROJECT ALTERNATIVES

Several alternative development projects have been considered for this site over the last several years. About two years ago, National Development developed plans for this site for 356 Residential Units plus 160,000 square feet of Office space. The current project consists of 424 Residential units and no office space. About one-half, 208 Residential units, would be age restricted to residents 55 years old and older. The current proposed project would generate 1,580 fewer vehicle-trips per day than the previous proposed project by National Development. Similarly, during the morning and evening peak hours, the current project would generate 236 and 223 fewer vehicle-trips per hour, respectively.

Table 4 summarizes the vehicle-trip generation characteristics for the previous proposed project as well as the available development alternatives and the current proposed project.

**TABLE 4
VEHICLE TRIP-GENERATION SUMMARY**

	<u>Baseline</u>	<u>As of Right</u>	<u>Park Square at</u> <u>Reading</u> ^c	<u>National</u>	<u>Current</u>
	<u>Re-Occupy</u>	<u>600 ksf Office</u>	<u>400 ksf Retail</u>	<u>Development</u>	<u>Project</u>
	<u>Existing</u>	<u>+</u>	<u>+</u>	<u>356 Residential</u>	<u>424</u>
	<u>208 ksf</u>	<u>300 Room</u>	<u>50 Residential</u>	<u>Units</u>	<u>Residential</u>
<u>Time Period/</u> <u>Direction of Travel</u>	<u>Office</u> ^a	<u>Hotel</u> ^a	<u>Units</u> ^a	<u>+ 160 ksf Office</u> ^a	<u>Units</u> ^b
Weekday Morning					
Peak Hour:					
Entering (vph) ^c	295	785	300	270	28
<u>Exiting (vph)</u>	<u>40</u>	<u>155</u>	<u>165</u>	<u>130</u>	<u>136</u>
Total (vph)	335	940	465	400	164
Weekday Evening					
Peak Hour:					
Entering (vph)	50	220	775	145	132
<u>Exiting (vph)</u>	<u>260</u>	<u>705</u>	<u>945</u>	<u>275</u>	<u>65</u>
Total (vph)	310	925	1,720	420	197
Average Weekday					
Entering (vpd) ^d	1,175	3,785	8,845	1,920	1,130
<u>Exiting (vpd)</u>	<u>1,175</u>	<u>3,785</u>	<u>8,845</u>	<u>1,920</u>	<u>1,130</u>
Total (vpd)	2,350	7,570	17,690	3,840	2,260

^a Source: VHB Memorandum to Scott Weiss dated January 23, 2007.

^b LUC = Land Use Code. Source: Trip Rates from *Trip Generation*, Eighth Edition: Institute of Transportation Engineers (ITE), Washington, DC, 2008; LUC #230 Residential Condominium.

To assess quality of flow along the study area roadways and intersections, an Intersection Level of Service Capacity Analysis was conducted under the following analysis conditions:

- 2010 Existing Traffic Volume Conditions
- 2015 No Build Traffic Volume Conditions
- 2015 Build Traffic Volume Conditions Without Mitigation
- 2015 Build Traffic Volume Conditions With Mitigation

The Capacity Analysis will provide an indication of how well the roadway facilities serve the traffic demands placed upon them.

METHODOLOGY

Level of Service

The primary result of capacity analysis is the assignment of level of service to traffic facilities under various traffic-flow conditions.¹ The concept of level of service is defined as a qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. A level-of-service definition provides an index to quality of traffic flow in terms of such factors as speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety.

Six levels of service are defined for each type of facility. They are given letter designations from A to F, with level-of-service (LOS) A representing the best operating conditions and LOS F the worst.

Since the level of service of a traffic facility is a function of the traffic flows placed upon it, such a facility may operate at a wide range of levels of service, depending on the time of day, day of week, or period of year.

¹ *Highway Capacity Manual* (HCM 2000): Transportation Research Board, Washington, DC, 2000.

Signalized Intersections

The levels of service for signalized intersections are calculated using the operational analysis methodology from the 2000 *Highway Capacity Manual*.² The method assesses the effects of signal type, timing, phasing, progression, and delay. Level-of-service designations are based solely on the criterion of calculated control delay per vehicle since delay is a measure of driver discomfort and frustration, fuel consumption and increased travel time. Table 5 summarizes the relationship between level of service and delay. The tabulated delay criterion may be applied in assigning level-of-service designations to individual lane groups, to individual intersection approaches or to entire intersections.

TABLE 5
LEVEL-OF-SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS^a

Level of Service	Average Control Delay (Seconds/Vehicle)
A	0 to 10
B	>10 to 20
C	>20 to 35
D	>35 to 55
E	>55 to 80
F	>80

^aSource: *Highway Capacity Manual* (HCM 2000): Transportation Research Board, Washington, DC, 2000.

Unsignalized Intersections

The levels of service for unsignalized intersections are determined by the application of a procedure described in the 2000 *Highway Capacity Manual*.³ The procedure accounts for lane configuration on both the minor and major approaches, conflicting traffic stream volumes and type of intersection control (STOP versus YIELD). First, potential capacity is calculated based on the number of lanes, traffic volume data, critical gap and follow-up times. The delay is then calculated based on the relationship between flow rate and capacity of the movement. Table 6 summarizes the relationship between level of service and expected delay to minor street traffic.

TABLE 6
LEVEL-OF-SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS^a

Level of Service	Average Control Delay (Seconds/Vehicle)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

^aSource: *Highway Capacity Manual* (HCM 2000): Transportation Research Board, Washington, DC, 2000.

²*Highway Capacity Manual* (HCM 2000): Transportation Research Board, Washington, DC, 2000.

³*Highway Capacity Manual* (HCM 2000): Transportation Research Board, Washington, DC, 2000.

TRAFFIC ANALYSIS RESULTS

Level of Service Capacity Analyses has been conducted at the study area intersections. The results of this analysis are summarized below by intersection with the actual analysis reproduced in the appendix of this report.

Signalized Intersections

The results of the signalized intersection analysis are tabulated below in Table 7.

As shown by the table 7, the Main Street/South Street intersection currently operates at LOS B during both the morning and evening peak hours. It will continue to operate at LOS B during both the morning and evening peak hours under 2015 Build with development traffic volume conditions. With mitigation to address the queuing along South Street westbound the intersection will operate at LOS C during both the morning and evening peak hours under 2015 Build with development traffic volume conditions.

The Main Street/Summer Street intersection will operate at LOS B/A during the morning/evening peak hours under 2015 No Build traffic volume conditions and it will continue to operate at LOS B/A with the construction and occupancy of the proposed project.

The South Street/West Street intersection currently operates at LOS D/C during the morning/evening peak hours and it will continue to operate at LOS D under 2015 Build with development traffic volume conditions.

Unsignalized Intersections

The results of the signalized intersection analysis are tabulated below in Table 8.

The left turns entering the Reading Woods development project are projected to operate at LOS A during both the morning and evening peak hours with the project fully occupied. The exiting movements from Jacob Way onto Main Street are projected to operate at LOS B.

The Hopkins Street eastbound and westbound approaches currently operate at LOS E/F during the morning peak hour and will continue to operate at a poor Level of Service under future conditions independent of the proposed project. Left turns from Main Street northbound to Hopkins Street currently operate at Level of Service A with no change anticipated with the construction of the proposed project.

The right turns from the Route 128 southbound off ramp currently operate at LOS B and this movement is projected to operate at LOS B/C under 2015 Build with development traffic volume conditions. It should be noted that the LOS does not account for the effect the Main Street blockage has on the calculated delay for this movement.

TABLE 7
SIGNALIZED INTERSECTION LEVEL-OF- SERVICE ANALYSIS SUMMARY

Location/ Peak Hour	<u>2010 Existing</u>		<u>2015 No Build</u>		<u>2015 Build Without Mitigation</u>		<u>2015 Build With Mitigation</u>	
	LOS/CD/v/c ^a	50 th /95 th Q ^b	LOS/CD/v/c	50 th /95 th Q	LOS/CD/v/c	50 th /95 th Q	LOS/CD/v/c	50 th /95 th Q
Main Street at South Street:								
Eastbound Approach	B/1.11/0.25	13'/54'	B/13.3/0.26	18'/63"	C/20.4/0.51	57'/144'	C/28.0/0.69	59'/141'
Westbound Approach	D/36.2/0.76	91'/229'	D/39.8/0.79	98'/257'	E/68.6/0.95	107'/301'	E/75.0/0.93	175'/352'
Northbound Approach	A/9.2/0.52	74'/114'	A/9.9/0.57	82'/125'	B/11.7/0.89	88'/136'	C/20.4/1.43	154'/250'
Southbound Approach	B/11.0/0.70	191'/259'	B/11.8/0.74	208'/283'	B/13.0/0.76	210'/284'	C/22.5/0.82	363'/515'
Weekday Morning Peak Hour	B/13.3/--	---	B/14.5/--	---	B/19.2/--	---	C/28.0/--	---
Eastbound Approach	C/26.9/0.56	57'/119'	C/27.7/0.58	61'/125'	C/29.8/0.67	82'/158'	C/30.5/0.67	84'/161'
Westbound Approach	C/27.6/0.33	30'/69'	C/28.0/0.35	32'/73'	C/27.6/0.35	35'/76'	D/47.1/0.57	40'/103'
Northbound Approach	A/5.2/0.47	80'/151'	A/5.8/0.53	94'/176'	A/9.2/0.72	122'/231'	C/22.9/0.88	198'/363'
Southbound Approach	B/13.4/0.44	107'/176'	B/14.3/0.49	124'/202'	B/15.8/0.52	138'/228'	B/17.4/0.55	154'/226'
Weekday Evening Peak Hour	B/11.0/--	---	B/11.6/--	---	B/14.3/--	---	C/22.8/--	---
Main Street at Summer Street:								
Eastbound Approach	C/32.6/0.63	60'/125'	C/33.9/0.65	64'/131'	C/33.9/0.65	64'/131'	---	---
Westbound Approach	D/37.1/0.52	58'/111'	D/38.1/0.55	61'/117'	D/38.1/0.55	61'/117'	---	---
Northbound Approach	A/4.2/0.24	33'/70'	A/4.4/0.25	36'/74'	A/4.4/0.26	38'/77'	---	---
Southbound Approach	A/5.5/0.46	95'/182'	A/5.8/0.48	106'/196'	A/5.8/0.48	106'/196'	---	---
Weekday Morning Peak Hour	A/9.8/--	---	B/10.2/--	---	B/10.2/--	---	---	---
Eastbound Approach	D/35.6/0.60	59'/115'	D/36.3/0.62	64'/124'	D/36.3/0.62	64'/124'	---	---
Westbound Approach	C/27.2/0.20	18'/47'	C/27.0/0.19	18'/48'	C/27.0/0.19	18'/48'	---	---
Northbound Approach	A/4.3/0.33	60'/113'	A/4.7/0.37	69'/131'	A/4.8/0.37	70'/132'	---	---
Southbound Approach	A/3.8/0.25	42'/81'	A/4.1/0.28	48'/94'	A/4.2/0.28	50'/96'	---	---
Weekday Evening Peak Hour	A/7.6/--	---	A/8.0/--	---	A/7.9/--	---	---	---

TABLE 7 (Continued)
SIGNALIZED INTERSECTION LEVEL-OF- SERVICE ANALYSIS SUMMARY

South Street at West Street:								
Eastbound Left Turn Lane	F/81.0/0.29	12'/38'	F/81.3/0.29	12'/38'	F/81.3/0.29	12'/38'	---	---
Eastbound Thur/Right Lane	B/12.7/0.27	113'/163'	B/12.8/0.28	120'/172'	B/12.9/0.29	122'/174'	---	---
Westbound Left Turn Lane	B/13.2/0.01	2'/10'	B/13.2/0.01	2'/10'	B/13.2/0.01	2'/10'	---	---
Westbound Thur/Right Lane	D/46.7/0.96	771'/1235'	E/56.3/1.00	862'/1333'	E/56.3/1.00	862'/1333'	---	---
Northbound Approach	E/68.4/0.89	280'/505'	E/77.7/0.94	301'/544'	F/90.5/1.00	327'/590'	---	---
Southbound Approach	B/13.4/0.21	21'/70'	B/13.3/0.21	21'/70'	B/13.3/0.21	21'/70'	---	---
Weekday Morning Peak Hour	D/43.3/--	---	D/50.7/--	---	D/53.5/--	---	---	---
-								
Eastbound Left Turn Lane	D/48.4/0.30	18'/48'	D/48.9/0.31	18'/48'	D/48.9/0.31	18'/48'	---	---
Eastbound Thur/Right Lane	C/32.4/0.97	546'/972'	D/41.0/1.01	668'/1053'	D/45.8/1.02	822'/1078'	---	---
Westbound Left Turn Lane	B/17.5/0.26	6'/26'	B/17.8/0.27	6'/27'	B/17.8/0.27	6'/27'	---	---
Westbound Thur/Right Lane	A/8.4/0.28	85'/132'	A/8.4/0.29	90'/139'	A/8.4/0.29	90'/139'	---	---
Northbound Approach	C/27.9/0.23	28'/65'	C/27.8/0.25	29'/68'	C/29.4/0.29	35'/78'	---	---
Southbound Approach	B/19.1/0.08	6'/29'	B/19.2/0.09	6'/29'	B/19.2/0.09	6'/29'	---	---
Weekday Evening Peak Hour	C/27.4/--	---	C/33.7/--	---	D/37.2/--	---	---	---

^a LOS = Level of Service, CD = Control Delay (seconds/vehicle) , v/c = volume to capacity ratio.

^b 50th Percentile and 95th Percentile Queue.

TABLE 8
UNSIGNALIZED INTERSECTION LEVEL-OF- SERVICE ANALYSIS

Location/Peak Hour	<u>2010 Existing</u>		<u>2015 No-Build</u>		<u>2015 Build Without Mitigation</u>	
	LOS/v/c/ACD ^a	95 th Queue	LOS/v/c/ACD	95 th Queue	LOS/v/c/ACD	95 th Queue
Main Street at Jacob Way:						
<i>Westbound Left-Turns Entering</i>						
Weekday Morning	-	---	-	--	A/0.02/0.8	1'
Weekday Evening	-	---	-	---	A/0.08/4.2	7'
<i>Northbound Left & Right Turns Exiting</i>						
Weekday Morning	-	---	-	--	B/0.17/10.1	15'
Weekday Evening	-	---	-	---	B/0.09/10.3	7'
Main Street at Hopkins Street:						
<i>Eastbound All Movements</i>						
Weekday Morning	E/0.79/44.5	164'	F/0.88/59.1	204'	F/0.89/63.0	213'
Weekday Evening	C/0.23/17.1	21'	C/0.28/19.9	28'	C/0.30/20.6	31'
<i>Westbound All Movements</i>						
Weekday Morning	F/1.01/>120	153'	F/1.31/>120	197'	F/1.40/>120	206'
Weekday Evening	D/0.42/34.0	49'	F/0.57/51.5	74'	F/0.60/57.0	80'
<i>Northbound Left Turns</i>						
Weekday Morning	A/0.17/5.4	15'	A/0.19/6.0	18'	A/0.20/6.2	19'
Weekday Evening	A/0.14/3.6	12'	A/0.16/3.9	14'	A/0.16/4.0	15'
<i>Southbound Left Turns</i>						
Weekday Morning	A/0.64/1.0	3'	A/0.04/1.0	3'	A/0.04/1.0	3'
Weekday Evening	A/0.09/2.8	7'	A/0.10/2.9	8'	A/0.10/2.9	8'
Main Street at Route 128 Southbound Off Ramp:						
<i>Westbound Right Turns</i>						
Weekday Morning	B/0.10/10.5	0.34	B/0.11/10.6	0.37	B/0.12/10.7	0.39
Weekday Evening	B/0.30/13.3	1.25	B/0.34/14.4	1.53	C/0.39/15.5	1.81

^a LOS = Level of service, v/c = volume to capacity ratio, ACD = Average Control Delay (seconds/vehicle).

^b 95th Q = 95th Percentile Queue expressed in feet or vehicles.

Dermot J. Kelly & Associates, Inc. (DJK) has completed a response to the FST peer review dated January 21, 2011 which reviewed the initial Traffic Impact and Access Study dated December 9, 2010. The Traffic Impact and Access Study was prepared for the proposed Reading Woods residential development located on Jacob Way in Reading, Massachusetts. Each comment is repeated below and the proponent response follows each comment.

Comment No. 1

Although the Town of Reading does not have guidelines for the preparation of a traffic impact study, the assessment should generally adhere to guidelines from Executive Office of Energy and Environmental Affairs (EEA), MassDOT and the Institute of Transportation Engineers (ITE). The assessment provides much of the required analysis, but does not adequately summarize the impacts of the project. Therefore, the study does not fully comply with MEPA requirements. The study does not make recommendations or conclusions at off-site locations. In addition, backup material is required to substantiate many of the analysis. As such, the traffic impact assessment requires additional material. Specific comments on the traffic assessment are discussed below:

Response: *The MEPA Office of the Executive Office of Energy and Environmental Affairs (EOEEA) as well as MassDOT Boston and MassDOT District 4 Office in Arlington recently reviewed the DJK December 9, 2010 Traffic Impact & Access Study (TIAS) that was submitted as part of the Environmental Notification Form (ENF). The February 4, 2011 MEPA Certificate on the ENF determined that “**The ENF included a Traffic Impact and Access Study that generally conforms to the EOEEA/MassDOT Guidelines for Traffic Impact Assessment**” and “**I find that no further MEPA review is required at this time.**”*

Comment No. 2

1. Study Area

- A. The study area for the proposed project consisted of four locations on Main Street (Route 28), the intersection of West Street/South Street and the site driveway (Jacob Way). Based on the level of anticipated trip generation and distribution for the proposed project, the study area seems adequate.

Response: *The proponent agrees with the above assessment and no additional response is required at this time.*

Comment No. 3

2. Traffic Volumes

- A. The weekday morning and evening peak hour traffic counts used in the traffic study were taken in November 2010. There was no discussion about seasonally adjusting the collected traffic volumes to represent average daily conditions. FST reviewed the 2007 MassHighway Seasonal Count Worksheet and determined that no seasonal adjustments are needed. FST concurs with the existing traffic volumes.

Response: *The proponent agrees with the above assessment and no additional response is required at this time.*

Comment No. 4

- B. The existing peak hour traffic volumes were projected to 2015 No Build traffic volumes by applying a 1% annual growth rate and adding traffic volumes generated by the nearby retail/restaurant project on Main Street (Route 28). Based on a review of MassHighway traffic count data, FST concurs with the use of a 1% annual growth rate. Supporting documents for the traffic generated by the planned development on Main Street and the portion that will be on the study area roadways was not included in the study or the Appendix. FST reviewed the backup information from the VHB report for the nearby retail/restaurant use. Based on this information, FST concurs with the 2015 No Build Volumes.

Response: *The proponent agrees with the above assessment and no additional response is required at this time.*

Comment No. 5

3. Accidents

- A. The MassHighway crash data for the years 2006, 2007, and 2008 were reviewed for the study area intersections. Of the study area intersections, the intersection of Main Street (Route 28)/Hopkins Street is the only location to have a crash rate greater than the average rate for District 4. However, existing deficiencies that could be contributing to the crashes were not discussed. For instance, it was not discussed that only right turns are permitted from Hopkins Street in both directions, however, the counts show a number of vehicles turning left and through. The consultant should identify existing deficiencies that may be contributing to the high crash rate.

Although it was not identified in the summary, one of this crashes involved an injured pedestrian. There is also currently an unsignalized crosswalk across all four lanes of Main Street (Route 28). Supplemental warning signage and advance yield lines should be considered. It should also be noted that a large percentage (30%) of these crashes involved personal injury.

Response: *A detailed response to the above comment is provided in Response to Comments No. 19 and No. 39.*

Comment No. 6

4. Trip Generation/Distribution

- A. The estimated traffic generated by the project used in the study was computed using the ITE Trip Generation Manual, Land Use Code (LUC) 230 "Residential Condominium/ Townhouse". FST concurs with this methodology and verified that the volumes in the last column of Table 3 were calculated correctly and should be used for the analysis.

For comparison purposes, the consultant also calculated "Actual Vehicle-Trip Generation" using "Observations at Existing 55 and Older Residential Development Projects". However, backup material for the three observed sites was not included for review. Furthermore, these volumes are lower than volumes reviewed by FST for numerous other existing age-restricted developments. FST agrees with the use of the "higher trip generation" as used in the study, however, we would not characterize the volumes as high or conservative, but rather as accurate.

Response: *The proponent does not agree with the above assertion that age restricted housing generates the same volume of traffic that market rate housing would generate. Nevertheless, traffic generation from market rate housing was used in all of the traffic analysis contained in this report.*

Comment No. 7

- B. During the weekday morning peak hour in Table 3, the exiting volume is shown to be 136 vehicles, while 164 vehicles are shown in the text and figures. Please clarify.

Response: *The report was revised using the total morning peak hour exiting volume of 136 vehicle-trips per hour as shown in the body of this report.*

Comment No. 8

- C. The current proposal is expected to generate approximately 59% of the Weekday Daily Volume of the previous National Development proposal. Therefore, the impact is expected to be less than the previous proposals. However, this does not equate to having no impact.

Response: *The proponent has not stated that this project does not have any impact. The proponent believes that the current mitigation proposed in the body of this report appropriately addresses the traffic related impacts of the proposed project.*

Comment No. 9

- D. Based on the text, the distribution and assignment of the new site trips to study area intersections is based on the year 2000 census Journey to Work data for the Town of Reading. However, no backup material is provided to show how these assignments were determined. The ultimate results are identical to the residential distribution used by VHB for the National Development project, and appear reasonable.

The consultant should provide backup information showing how the assignment was determined. If information is being copied from a document produced by a different consultant, the work must be cited and included in the Appendix.

Response: *The proponent agrees that the trip distribution and assignment patterns for this project appear reasonable and the VHB citation appears in the body of this report.*

Comment No. 10

5. Sight Distance

- A. The study recommended the modification of Jacob Way to provide a 90-degree intersection and to achieve the desired intersection sight distance (ISD). Meeting the desired intersection sight distance will require the removal of vegetation along the southern side of South Street.

A plan should be provided that shows the desired sight triangles at Jacob Way and any vegetation that must be cleared to achieve the desired intersection sight distance. Showing the sight lines on the plan will also ensure that other features of the site improvements such as landscaping, fencing and signs will not impact the required lines of sight. In conjunction with the

plan, the proponent should commit to continuously monitor the site and keep the necessary areas clear of signs and vegetation that could block sight lines.

Response: *The latest Marchionda Associates Site Development Plans graphically presents the Site Distance Maintenance Area proposed for the proposed project. The proponent will agree to monitor and keep this area clear of signs and vegetation as part of Planning Board Conditions of Approval for the current proposed project.*

This response is repeated in Response to Comment No. 33.

Comment No. 11

6. Capacity Analysis

- A. The capacity analysis was conducted using Synchro Version 6, which is acceptable. However, the consultant did not utilize the Highway Capacity Manual output, as required by MassDOT for the calculations of the Delay and Level of Service. In addition to not applying the required formulas, the printouts supplied do not show all the inputs for verification, such as heavy vehicle percentages and peak hour factors. The printouts supplied are able to show the correct queue lengths.

Response: *It should be noted that all heavy vehicle percentages and peak hour factors are shown on the Traffic Volume data collection sheets in Appendix A. The Synchro "Lane Group Flow" volumes shown in Appendix C could have been checked by comparing the actual traffic volumes and the peak hour factors shown in Appendix A. DJK has submitted many Traffic Impact and Access Studies, Environmental Impact Reports and Functional Design Reports to MassDOT District 4 Arlington, MassDOT Boston, MEPA as well as other consultants including FST and we have never been asked to print out Highway Capacity Manual (HCM) outputs. Additionally, the Traffic Impact and Access Study that was reviewed by FST was also reviewed by MassDOT Boston and MassDOT District 4 in Arlington and neither MassDOT departments requested the Highway Capacity Manual (HCM) outputs. Nevertheless, all analysis was re-printed with HCM outputs reproduced in the body of this report.*

This response is repeated in Response to Comment No. 34.

Comment No. 12

- B. The analysis of the signalized intersections indicates that they will operate at an acceptable condition. However, the analysis presents only the overall level of service, and several intersections will have one or more intersection approaches operating at LOS E or F. A comprehensive comparison of the No Build to Build Analysis should be provided for each approach lane. This comparison should include v/c ratio, Delay, Level of Service, and 50% and 95% Queues.

Response: *The requested information appears on the actual Level of Service Analysis sheets shown in Appendix C. Nevertheless, Tables 7 and 8 contained in this report were revised to include the requested information in tabular form.*

This response is repeated in Response to Comment No. 35.

Comment No. 13

- C. Since a summary was not provided, FST reviewed the analysis sheets in the Appendix. During the morning peak hour, the South Street approach to West Street will degrade from LOS E with 77.7 seconds of delay without the project to LOS F with 92.8 seconds of delay with the project, with a 95% queue of 596 feet. These poor operations should be addressed and improvements should be considered at this location.

Response: *A detailed response to the above comment is provided in Response to Comments No. 18 and No. 36.*

Comment No. 14

- D. During the morning peak hour, the South Street westbound approach to Main Street (Route 28) will degrade from LOS D with 39.8 seconds of delay without the project to LOS F with 82.7 seconds of delay with the project. These poor operations should be addressed and improvements should be considered at this location.

Response: *It should be noted that the proposed project will add 1 additional vehicle to the South Street westbound approach to this intersection during the morning peak hour. It should also be noted that the delay for this approach could be reduced simply by moving green time from Main Street to South Street westbound, however the delays for Main Street would increase. Nevertheless, additional mitigation is proposed at this intersection as described in Response to Comments No. 17 and No. 38.*

This response is repeated in Response to Comment No. 37.

Comment No. 15

- E. An evaluation of vehicle queue lengths at the study area intersections was not included in the report. A review of the capacity analysis in the appendix of the report reveals that the eastbound 95% Queue on South Street at Main Street (Route 28) is projected to be 163 feet during the morning peak hour and 158 feet during the evening peak hour. There appears to be approximately 150 feet between the relocated Jacob Way and the stop line at Main Street (Route 28). This indicates that the queue will extend past the driveway, potentially blocking left turns from entering the site. This needs to be addressed by the proponent.

Response: *A detailed response to the above comment is provided in Response to Comment No. 17 and No 38.*

Comment No. 16

- F. The unsignalized approaches of Hopkins Road at Main Street (Route 28) experiences LOS F conditions currently and in the future.

Response: *Mitigation for the Hopkins Street intersection is discussed in Response to Comments No. 19 and No. 39.*

Comment No. 17

7. Impacts/Mitigation

The assessment does not include any significant recommendations for mitigation beyond modifying the site drive. Mitigation was proposed for the previous proposals at the site. Although the current proposal will generate less traffic than the previous proposals, some mitigation is necessary to offset project impacts. FST recommends the following mitigation measures be considered.

- A. Consider geometric and traffic signal improvements at the intersection of Main Street (Route 28)/ South Street. The mitigation at this location should consist of widening South Street to provide an additional turn pocket on South Street eastbound and westbound approaches.

Response: *The above referenced mitigation was considered for this intersection and it was determined that widening South Street to provide left turn lanes for both the eastbound and westbound approaches is not practical nor feasible for the current proposed project. It should be noted that the overall intersection*

Level of Service at this location under 2015 Build with development traffic volume conditions is B. However, based on a suggestion by MassDOT, the current additional mitigation proposed for this intersection now includes providing split phases for the South Street eastbound and westbound movements. The eastbound and westbound South Street movements currently operate together under a single concurrent traffic signal phase, i. e. both the eastbound and westbound movements receive a green light at the same time. The proponent will implement these changes subject to the town approval of these changes, approval of the current Site Development Plans, the project proceeding to construction and with the approval of these changes by MassDOT. The LOS, delays, v/c ratios and queue lengths with and without mitigation is shown in the body of this report.

Additionally, Jacob Way will be re-located an additional 50 feet further to the west. With the above traffic signal mitigation, the AM/PM 95th percentile queue lengths along the South Street eastbound approach will change slightly to 141'/161' from 144'/158'. The center of the relocated Jacob Way was 155'/171' from the Stop Line/western edge of Main Street. With the second relocation of Jacob Way, the centerline of the driveway should now be approximately 201'/221' from the Stop Line/western edge of Main Street.

Furthermore, a "DO NOT BLOCK INTERSECTION" sign (MUTCD referenced R10-7) is suggested to be placed along South Street west of Jacob Way facing eastbound traffic.

A similar response addressing the South Street eastbound queue is provided in Response to Comment No 38.

Comment No. 18

- B. Consider geometric and traffic signal-timing improvements at the intersection of West Street/ South Street. If geometric improvements are infeasible, a post Build traffic monitoring study could be considered to verify future traffic volumes and make traffic signal timing adjustments as necessary, to reflect actual future volumes.

Response: *The West Street/South Street intersection was reconstructed approximately three years ago when a traffic signal was installed for the Archstone residential development project. Additional practical geometric improvements are not feasible at this location at this time due in part to the fact that the I-93 overpass is located approximately 200' to the west of the South Street/West Street intersection. Consequently, as requested above, the proponent is willing to do a post development traffic study which would include morning and evening peak hour traffic counts and a traffic analysis to determine if traffic signal timing adjustments are necessary at the signalized intersection. If traffic signal timing adjustments are necessary and with the approval of the Town Engineer, traffic signal timing adjustments will be completed.*

This response is repeated under response to comment No. 36.

Comment No. 19

- C. Due to the high accident rates and poor operations at the Main Street (Route 28)/ Hopkins Street intersection, improvements should be considered at this location. In the absence of proponent-sponsored mitigation at this location, the proponent could contribute toward design plans at this location.

Response: *The proponent will install the requested signs as noted in Comments No. 5 prior to the occupancy of the first residential unit. The signs and locations will be determined by the Peer Review Consultant, the Town Engineer and MassDOT (for those signs on Main Street only).*

Additionally, the proponent will make a \$10,000 contribution towards design plans for the Hopkins Street/Main Street intersection prior to occupancy of the 50th residential unit.

This response is repeated in Response to Comment No. 39.

Comment No. 20

- D. The Site Access was noted to be significantly different than the access plan previously proposed for the National Development project. The previous plan involved realigning South Street to intersect with Jacob Way. Since the current proposal is expected to generate less traffic than the previous proposal, and since Jacob Way is expected to have lower volumes than South Street, the plan as proposed is suitable for the proposed access.

Response: *The proponent agrees that the proposed access is suitable for the proposed project and no additional response is necessary at this time.*

Comment No. 21

8. Transportation Demand Management (TDM) Measures

- A. The consultant suggested a partnership with MassRides, in addition to bicycle racks to reduce to reduce the travel demand of the site. FST agrees with these recommendations. The developer needs to provide a written commitment to these measures.

Response: *The proponent is willing to provide a written commitment to these measures as part of the Planning Board Conditions of Approval for the current proposed Site Development Plans.*

Comment No. 22

9. Site Plan Review

From a traffic circulation and design review, the Site Plan provided is well designed. FST recommends the following minor modifications to the plan.

- Add Stop lines and Stop signs (R1-1) on the Jacob way approach to South Street and from the Eastern Middlesex Association of Realtors parking lot approach to Jacob Way.

Response: *Stop lines and Stop signs for the Jacob Way approach and the Eastern Middlesex Association of Realtors driveway approach are shown on the Marchionda Associates latest Site Development Plans.*

Comment No. 23

- Provide a double yellow center line (DYCL) on Jacob Way from South Street to the proposed mini roundabout.

Response: *The previous proposed double yellow center line on Jacob Way was extended to the proposed mini roundabout as shown on latest Marchionda Associates Site Development Plans.*

Comment No. 24

- A new crosswalk is proposed across South Street, but does not appear to connect to the existing sidewalk on the corner of Main Street (Route 28)/ South Street. A short bituminous sidewalk section should be added in front of #370 South Street to provide a pedestrian connection.

Response: *Based on recent Planning Board comments, a crosswalk now appears across Jacob Way south of South Street and across South Street east of Jacob Way to an existing sidewalk creating one continuous pedestrian path between the Reading Woods residential development and Main Street.*

Marchionda Associates Site Development Plans graphically present the referenced sidewalks and crosswalks.

Comment No. 25

- Two raised crosswalks are proposed on Jacob Way. MUTCD compliant signage and pavement marking should accompany the raised crosswalks to alert drivers of the vertical deflection.

Response: *There is now only one raised crosswalk which will be signed with two "SPEED HUMP" (MUTCD referenced W17-1) warning signs located at the raised crosswalk as shown on the latest Marchionda Associates Site Development Plans.*

Comment No. 26

- A mini roundabout is proposed. MUTCD compliant signage should accompany the roundabout.

Response: *Additional signage and pavement markings were added to the roundabout and are shown on the latest Marchionda Associates Site Development Plans.*

Comment No. 27

- The roundabout is oddly shaped, which seems to prohibit particular movements. This should be addressed.

Response: *We do not feel the roundabout is oddly shaped. The roundabout as proposed was designed in order to address concerns of the Fire and Engineering Departments in order to encourage particular movements. The roundabout does not prohibit any particular movements and will serve as an effective traffic calming measure for the development prior to entering the parking areas.*

Comment No. 28

- The two parking spaces located between Leah Way and the parking field for Building 3, are located in an awkward location and should be relocated or removed.

Response: *The proponent believes the 2 parking spaces in question are fine and are needed to provide desired overflow and guest parking spaces.*

Comment No. 29

- A 30-foot turning radius was used at all locations where internal roadways intersect and where all parking fields intersect with roadways. The wide radius provides for easy turns, especially for trucks. However, they also lengthen the pedestrian crossing distances or push the pedestrian crossing further from the intersections, in addition to encouraging higher speed turns. At locations where parking fields intersect the internal roadways, FST recommends using a smaller 20-foot radius. At all locations where two internal roadways intersect, we recommend keeping the 30-foot radius.

Response: *Most corners are shown as 30 foot radius in order to comply with the Fire Department request.*

Comment No. 30

10. Other Issues

- A. In the Public Transportation Section, the headways on the Haverhill Line were incorrectly noted as between 2 and 30 minutes, instead of 20-30 minutes as the current schedule indicates. It appears the consultant copied a typo from the VHB report without verifying the information.

Response: *This typo was corrected in the body of this report.*

Comment No. 31

- B. In the study area, Main Street (Route 28) and I-95 are state highways under the jurisdiction of MassDOT. A state highway access permit will be required for the project and any changes to Main Street (Route 28) will have to be reviewed and approved by MassHighway.

Response: *The proposed project by itself requires an "Indirect Highway Access" permit from MassDOT. The proponent is aware that any changes to Main Street will require the review and approval of MassDOT.*

Comment No. 32

SUMMARY/ FINDINGS

The following provides a brief summary of the key findings of the peer review.

1. The consultant should provide backup information showing how the trip assignment was determined. If information is being used from a document produced by a different consultant, the work must be cited and included in the Appendix.

Response: *The proponent agrees that the trip distribution and assignment patterns for this project appear reasonable and the VHB citation appears in the body of this report.*

Comment No. 33

2. A plan should be provided that shows the desired sight triangles at Jacob Way and any vegetation that must be cleared to achieve the desired intersection sight distance. In conjunction with the plan, the proponent should commit to continuously monitor the site and keep the necessary areas clear of signs and vegetation that could block sight lines.

Response: *The latest Marchionda Associates Site Development Plans graphically presents the Site Distance Maintenance Area proposed for the proposed project. The proponent will agree to monitor and keep this area clear of signs and vegetation as part of Planning Board Conditions of Approval for the current proposed project.*

This response is repeated in Response to Comment No. 10.

Comment No. 34

3. Recalculate analysis results using the Highway Capacity Manual output, as required by MassDOT.

Response: *It should be noted that all heavy vehicle percentages and peak hour factors are shown on the Traffic Volume data collection sheets in Appendix A. The Synchro "Lane Group Flow" volumes shown in Appendix C could have been checked by comparing the actual traffic volumes and the peak hour factors shown in Appendix A. DJK has submitted many Traffic Impact and Access Studies, Environmental Impact Reports and Functional Design Reports to MassDOT District 4 Arlington, MassDOT Boston, MEPA as well as other consultants including FST and we have never been asked to print out Highway Capacity Manual (HCM) outputs. Additionally, the Traffic Impact and Access Study that was reviewed by FST was also reviewed by MassDOT Boston and MassDOT District 4 in Arlington and*

neither MassDOT departments requested the Highway Capacity Manual (HCM) outputs. Nevertheless, all analysis was re-printed with HCM outputs reproduced in the body of this report. This response is repeated in Response to Comment No. 11.

Comment No. 35

4. A comprehensive comparison of the No Build to Build Analysis should be provided for each approach lane. This comparison should include v/c ratio, Delay, Level of Service, and 50% and 95% Queues.

Response: *The requested information appears on the actual Level of Service Analysis sheets shown in Appendix C. Nevertheless, Tables 7 and 8 contained in this report were revised to include the requested information in tabular form.*

This response is repeated in Response to Comment No. 10.

Comment No. 36

5. During the morning peak hour, the South Street approach to West Street will degrade from LOS E with 77.7 seconds of delay without the project to LOS F with 92.8 seconds of delay with the project, with a 95% queue of 596 feet. If geometric improvements are infeasible, a post Build traffic monitoring study could be considered to verify future traffic volumes and make traffic signal timing adjustments as necessary, to reflect actual Future Volumes.

Response: *The West Street/South Street intersection was reconstructed approximately three years ago when a traffic signal was installed for the Archstone residential development project. Additional practical geometric improvements are not feasible at this location at this time due in part to the fact that the I-93 overpass is located approximately 200' to the west of the South Street/West Street intersection. Consequently, as requested above, the proponent is willing to do a post development traffic study which would include morning and evening peak hour traffic counts and a traffic analysis to determine if traffic signal timing adjustments are necessary at the signalized intersection. If traffic signal timing adjustments are necessary and with the approval of the Town Engineer, traffic signal timing adjustments will be completed.*

This response is repeated under response to comment No. 18.

Comment No. 37

6. During the morning peak hour, the South Street westbound approach to Main Street (Route 28) will degrade from LOS D with 39.8 seconds of delay without the project to LOS F with 82.7 seconds of delay with the project. These poor operations should be addressed and improvements should be considered at this location. The mitigation at this location should consist of widening South Street to provide an additional turn pocket in each direction.

Response: *It should be noted that the proposed project will add 1 additional vehicle to the South Street westbound approach to this intersection during the morning peak hour. It should also be noted that the delay for this approach could be reduced simply by moving green time from Main Street to South Street westbound, however the delays for Main Street would increase. Nevertheless, additional mitigation is proposed at this intersection as described in Response to Comments No. 17 and No. 38.*

This response is repeated in Response to Comment No. 14.

Comment No. 38

7. The eastbound Queue on South Street eastbound at Main Street (Route 28) is projected to extend past the Jacob Way driveway, potentially blocking left turns from entering the site. This needs to be addressed by the proponent.

Response: The 95th percentile eastbound queue on South Street eastbound at the Main Street intersection was not projected to extend past the Jacob Way intersection. However, based on a suggestion by MassDOT, the current additional mitigation proposed for this intersection now includes providing a split phases for the South Street eastbound and westbound movements. The eastbound and westbound South Street movements currently operate together under a single concurrent traffic signal phase, i. e. both the eastbound and westbound movements receive a green light at the same time. The proponent will implement these changes subject to the town approval of these changes, approval of the current Site Development Plans, the project proceeding to construction and with the approval of these changes by MassDOT. The LOS, delays, v/c ratios and queue lengths with and without mitigation is shown in the body of this report.

Additionally, Jacob Way will be re-located an additional 50 feet further to the west. With the above traffic signal mitigation, the AM/PM 95th percentile queue lengths along the South Street eastbound approach will change slightly to 141'/161' from 144'/158'. The center of the relocated Jacob Way was 155'/171' from the Stop Line/western edge of Main Street. With the second relocation of Jacob Way, the centerline of the driveway should now be approximately 201'/221' from the Stop Line/western edge of Main Street.

Furthermore, a "DO NOT BLOCK INTERSECTION" sign (MUTCD referenced R10-7) is suggested to be placed along South Street west of Jacob Way facing eastbound traffic.

A similar response to the above issue is provided in Response to Comment No 17.

Comment No. 39

8. Due to the high accident rates and poor operations at the Main Street (Route 28)/ Hopkins Street intersection, improvements should be considered at this location. In the absence of proponent-sponsored mitigation at this location, the proponent could contribute toward design plans at this location.

Response: The proponent will install the requested signs as noted in Comments No. 5 prior to the occupancy of the first residential unit. The signs and locations will be determined by the Peer Review Consultant, the Town Engineer and MassDOT (for those signs on Main Street only).

Additionally, the proponent will make a \$10,000 contribution towards design plans for the Hopkins Street/Main Street intersection prior to occupancy of the 50th residential unit.

This response is repeated in Response to Comment No. 19.

Comment No. 40

9. The consultant suggested a partnership with MassRides, in addition to bicycle racks to reduce to reduce the travel demand of the site. FST agrees with these recommendations. The developer needs to provide a written commitment to these measures.

Response: The proponent commitment to working with MassRides is suggested to be noted in the Planning Board Conditions of Approval of the current proposed Site Development Plans.

Comment No. 41

10. Address recommendations for the Site Plan.

Response: The Site Plan recommendations were addressed above in Response To Comment No's. 22 to 29.

APPENDICES

APPENDIX A - TRAFFIC VOLUME DATA

APPENDIX B - VEHICLE ACCIDENT DATA

APPENDIX C - LEVEL OF SERVICE ANALYSIS

APPENDIX D - HCM LEVEL OF SERVICE ANALYSIS

If the APPENDIX is not attached to this copy of the report please contact DJK Associates, Inc. at 978-664-2205.

APPENDIX A - TRAFFIC VOLUME DATA



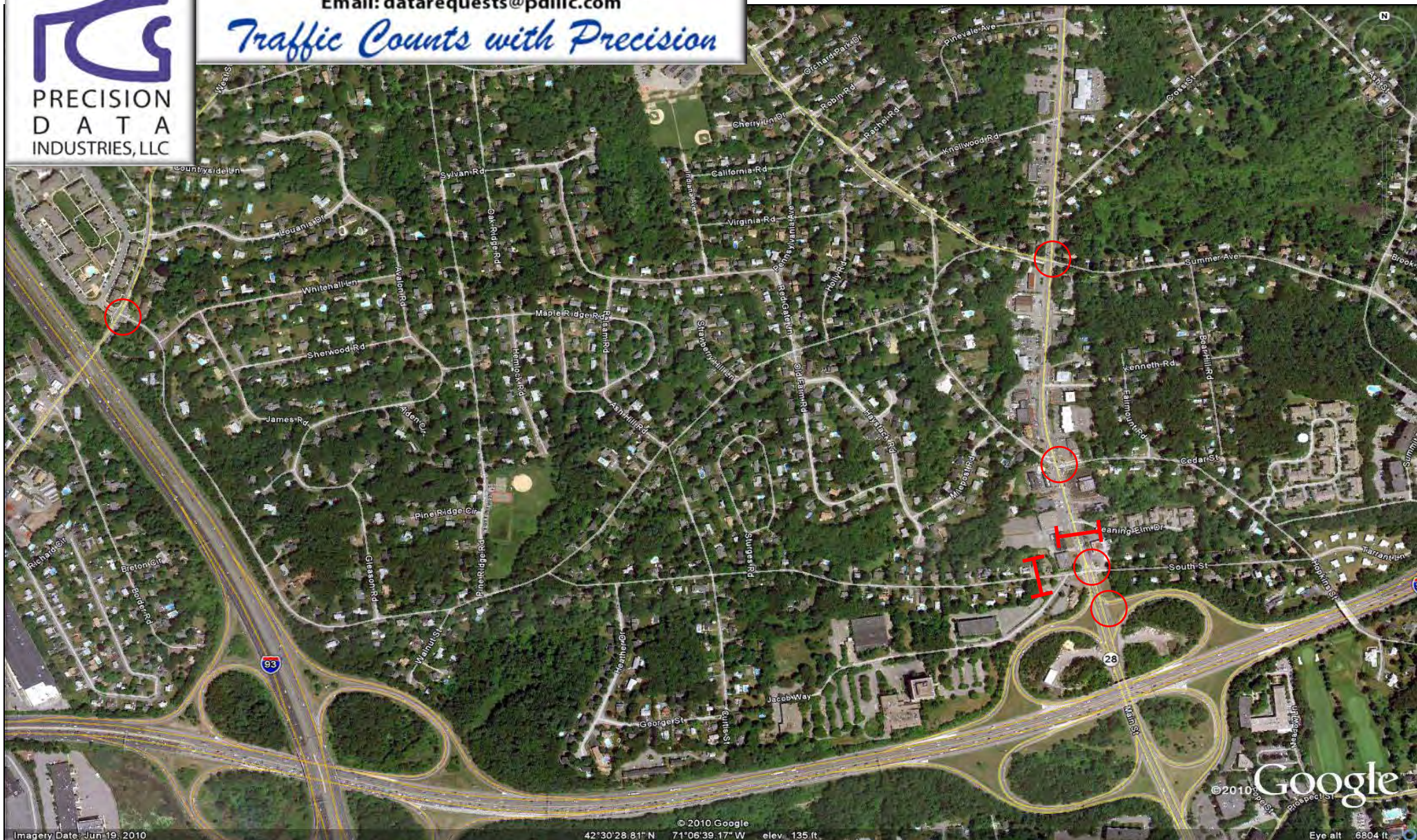
PRECISION
DATA
INDUSTRIES, LLC

PRECISION DATA INDUSTRIES, LLC

Office: 508.481.3999 Fax: 508.545.1234

Email: datarequests@pdillc.com

Traffic Counts with Precision



Imagery Date: Jun 19, 2010

© 2010 Google
42°30'28.81" N 71°06'39.17" W elev. 135 ft.

© 2010 Google
Eye alt 6804 ft.

Client:
DJK Associates

Engineer:
D. Kelly

Site Code:
809

Date:
Wed 11/3 thru Thurs 11/4/10

PDI Job Number:
102371

City, State:
Reading, MA

Main Street (Route 28)
north of South Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly



102371 A Volume
Site Code: 809

Start Time	NB		SB		Combined		03-Nov- 10 Wed
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	18	160	8	151	26	311	
12:15	10	166	5	159	15	325	
12:30	3	150	7	162	10	312	
12:45	10	41 156	2 632	22 155	12 627	311 1259	
01:00	5	141	2	155	7	296	
01:15	6	175	1	157	7	332	
01:30	2	164	3	150	5	314	
01:45	9	22 120	3 600	9 180	12 642	300 1242	
02:00	3	158	0	156	3	314	
02:15	2	154	1	148	3	302	
02:30	4	156	3	163	7	319	
02:45	1	10 161	6 629	10 139	7 606	300 1235	
03:00	3	167	4	175	7	342	
03:15	4	182	3	187	7	369	
03:30	4	179	0	141	4	320	
03:45	0	11 178	4 706	11 145	4 648	323 1354	
04:00	3	181	7	156	10	337	
04:15	2	202	4	166	6	368	
04:30	7	193	14	156	21	349	
04:45	6	18 184	11 760	36 163	17 641	347 1401	
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05:30	11	186	35	159	46	345	
05:45	28	64 179	50 778	137 158	78 617	337 1395	
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07:00	69	142	219	91	288	233	
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08:30	141	86	218	64	359	150	
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09:15	121	74	182	58	303	132	
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09:45	100	452 52	265 137	658 24	207 237	76 472	
10:00	104	58	138	42	242	100	
10:15	115	44	136	31	251	75	
10:30	116	34	147	26	263	60	
10:45	159	494 37	173 159	580 27	126 318	64 299	
11:00	126	30	167	28	293	58	
11:15	149	22	149	30	298	52	
11:30	153	14	156	9	309	23	
11:45	133	561 15	81 168	640 9	76 301	24 157	
Total	2770	6169	4750	5401	7520	11570	
Percent	36.8%	53.3%	63.2%	46.7%			
Day Total		8939		10151		19090	
Peak	10:45	04:30	07:15	02:30	07:15	04:30	
Vol.	587	790	1069	664	1462	1409	
P.H.F.	0.923	0.940	0.941	0.888	0.957	0.955	



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
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Email: datarequests@pdillc.com

Main Street (Route 28)
north of South Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

102371 A Volume
Site Code: 809

Start	NB		SB		Combined		04-Nov-10
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Thu
12:00	18	131	16	141	34	272	
12:15	14	132	3	156	17	288	
12:30	7	158	9	138	16	296	
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01:00	5	154	8	151	13	305	
01:15	5	153	4	149	9	302	
01:30	10	142	2	158	12	300	
01:45	4	131	5	127	9	258	1165
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02:15	3	160	4	139	7	299	
02:30	5	177	3	167	8	344	
02:45	5	139	1	146	6	285	1207
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03:15	3	145	4	159	7	304	
03:30	2	192	1	165	3	357	
03:45	2	183	4	142	6	325	1290
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04:15	5	187	10	131	15	318	
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05:30	13	211	43	135	56	346	
05:45	27	180	49	152	76	332	1335
06:00	35	175	110	146	145	321	
06:15	42	193	150	109	192	302	
06:30	49	175	185	122	234	297	
06:45	72	150	228	101	300	251	1171
07:00	86	149	255	132	341	281	
07:15	62	128	278	108	340	236	
07:30	85	109	269	110	354	219	
07:45	85	105	275	88	360	193	929
08:00	113	108	256	99	369	207	
08:15	90	93	258	100	348	193	
08:30	112	89	230	65	342	154	
08:45	168	76	191	69	359	145	699
09:00	124	77	186	69	310	146	
09:15	114	59	173	57	287	116	
09:30	108	66	163	54	271	120	
09:45	113	46	144	35	257	81	463
10:00	121	52	135	47	256	99	
10:15	129	46	165	48	294	94	
10:30	134	38	144	27	278	65	
10:45	128	27	129	21	257	48	306
11:00	139	20	143	33	282	53	
11:15	123	25	127	22	250	47	
11:30	143	16	136	28	279	44	
11:45	142	25	142	23	284	48	192
Total	2702	5895	4739	5230	7441	11125	
Percent	36.3%	53.0%	63.7%	47.0%			
Day Total	8597		9969		18566		
Peak	11:00	05:30	07:15	02:30	07:30	05:00	
Vol.	547	759	1078	628	1431	1335	
P.H.F.	0.956	0.899	0.969	0.940	0.970	0.965	



PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
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Email: datarequests@pdilc.com

South Street
west of Jacob Way
City, State: Reading, MA
Client: DJK Associates/D. Kelly

102371 B Volume
Site Code: 809

Start	EB		WB		Combined		03-Nov-10 Wed	
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		
12:00	3	20	1	18	4	38		
12:15	0	19	3	20	3	39		
12:30	0	18	3	21	3	39		
12:45	0	23	1	23	1	46	162	
01:00	1	23	2	26	3	49		
01:15	0	25	0	15	0	40		
01:30	0	23	0	22	0	45		
01:45	2	26	2	29	4	55	189	
02:00	0	22	1	14	1	36		
02:15	0	31	0	27	0	58		
02:30	1	23	1	22	2	45		
02:45	0	24	0	24	0	48	187	
03:00	0	24	1	42	1	66		
03:15	1	24	1	18	2	42		
03:30	0	28	1	23	1	51		
03:45	0	27	1	15	1	42	201	
04:00	1	38	0	24	1	62		
04:15	2	42	0	24	2	66		
04:30	1	33	1	21	2	54		
04:45	2	27	0	25	2	52	234	
05:00	3	47	2	23	5	70		
05:15	5	56	0	26	5	82		
05:30	4	47	4	33	8	80		
05:45	7	45	3	33	10	78	310	
06:00	13	38	4	42	17	80		
06:15	6	39	9	23	15	62		
06:30	15	31	21	25	36	56		
06:45	25	28	20	16	45	44	242	
07:00	20	26	30	22	50	48		
07:15	34	17	47	25	81	42		
07:30	26	19	42	17	68	36		
07:45	23	12	66	12	76	24	150	
08:00	31	11	52	16	83	27		
08:15	23	13	57	25	80	38		
08:30	20	14	47	11	67	25		
08:45	22	7	19	19	41	26	116	
09:00	12	3	10	14	22	17		
09:15	23	6	19	9	42	15		
09:30	14	3	20	10	34	13		
09:45	25	4	10	9	35	13	58	
10:00	9	4	12	6	21	10		
10:15	12	3	17	4	29	7		
10:30	14	1	24	5	38	6		
10:45	16	3	18	6	34	9	32	
11:00	12	2	22	3	34	5		
11:15	27	4	13	5	40	9		
11:30	13	1	19	4	32	5		
11:45	28	2	23	3	51	5	24	
Total	496	1006	649	899	1145	1905		
Percent	43.3%	52.8%	56.7%	47.2%				
Day Total	1502		1548		3050			
Peak	07:15	05:00	07:45	05:15	07:15	05:15		
Vol.	114	195	222	134	321	320		
P.H.F.	0.838	0.871	0.841	0.798	0.902	0.976		

South Street
west of Jacob Way
City, State: Reading, MA
Client: DJK Associates/D. Kelly



102371 B Volume
Site Code: 809

Start	EB		WB		Combined		04-Nov-10 Thu
Time	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00	2	20	6	19	8	39	
12:15	1	18	2	17	3	35	
12:30	1	17	1	24	2	41	
12:45	2	19	2	13	4	32	147
01:00	0	19	0	11	0	30	
01:15	2	12	2	18	4	30	
01:30	0	14	1	16	1	30	
01:45	0	16	0	17	0	33	123
02:00	0	25	0	16	0	41	
02:15	0	18	0	20	0	38	
02:30	0	16	0	18	0	34	
02:45	1	22	1	30	2	52	165
03:00	0	21	0	19	0	40	
03:15	0	23	0	25	0	48	
03:30	0	31	0	37	0	68	
03:45	1	31	0	28	1	59	215
04:00	1	44	0	9	1	53	
04:15	1	42	0	27	1	69	
04:30	1	35	0	25	1	60	
04:45	1	40	0	25	1	65	247
05:00	1	45	3	23	4	68	
05:15	2	49	2	23	4	72	
05:30	5	45	3	39	8	84	
05:45	5	32	7	25	12	57	281
06:00	10	36	5	23	15	59	
06:15	7	31	10	32	17	63	
06:30	12	31	15	30	27	61	
06:45	28	29	22	20	50	49	232
07:00	26	9	30	16	56	25	
07:15	33	19	48	26	81	45	
07:30	23	18	51	16	74	34	
07:45	28	10	56	8	84	18	122
08:00	23	9	71	17	94	26	
08:15	28	6	58	14	86	20	
08:30	21	14	49	11	70	25	
08:45	25	8	36	8	61	16	87
09:00	21	3	26	11	47	14	
09:15	17	5	22	21	39	26	
09:30	14	5	19	8	33	13	
09:45	17	4	29	8	46	12	65
10:00	14	4	22	11	36	15	
10:15	14	0	12	7	26	7	
10:30	15	5	9	4	24	9	
10:45	17	3	8	4	25	7	38
11:00	11	1	10	5	21	6	
11:15	18	3	15	3	33	6	
11:30	16	1	19	2	35	3	
11:45	17	1	24	2	41	3	18
Total	482	909	696	831	1178	1740	
Percent	40.9%	52.2%	59.1%	47.8%			
Day Total	1391		1527		2918		
Peak	06:45	04:45	07:30	05:30	07:30	04:45	
Vol.	110	179	236	119	338	289	
P.H.F.	0.833	0.913	0.831	0.763	0.899	0.860	



PRECISION
D A T A
INDUSTRIES, LLC

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N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 A
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			I-95 SB Ramps From East			Main Street (Route 28) From South			I-95 SB Ramps From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	123	214	0	16	0	0	174	92	0	37	0	0	656
07:15 AM	124	261	0	13	0	0	167	101	0	46	0	0	712
07:30 AM	141	259	0	20	0	0	177	126	0	27	0	0	750
07:45 AM	134	279	0	13	0	0	156	146	0	39	0	0	767
Total	522	1013	0	62	0	0	674	465	0	149	0	0	2885
08:00 AM	122	247	0	12	0	0	210	171	0	48	0	0	810
08:15 AM	120	259	0	27	0	0	195	147	0	35	0	0	783
08:30 AM	102	212	0	26	0	0	183	142	0	61	0	0	726
08:45 AM	98	171	0	26	0	0	133	175	0	54	0	0	657
Total	442	889	0	91	0	0	721	635	0	198	0	0	2976
Grand Total	964	1902	0	153	0	0	1395	1100	0	347	0	0	5861
Apprch %	33.6	66.4	0	100	0	0	55.9	44.1	0	100	0	0	
Total %	16.4	32.5	0	2.6	0	0	23.8	18.8	0	5.9	0	0	
Cars	949	1878	0	149	0	0	1366	1062	0	333	0	0	5737
% Cars	98.4	98.7	0	97.4	0	0	97.9	96.5	0	96	0	0	97.9
Heavy Vehicles	15	24	0	4	0	0	29	38	0	14	0	0	124
% Heavy Vehicles	1.6	1.3	0	2.6	0	0	2.1	3.5	0	4	0	0	2.1

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	141	259	0	400	20	0	0	20	177	126	0	303	27	0	0	27	750
07:45 AM	134	279	0	413	13	0	0	13	156	146	0	302	39	0	0	39	767
08:00 AM	122	247	0	369	12	0	0	12	210	171	0	381	48	0	0	48	810
08:15 AM	120	259	0	379	27	0	0	27	195	147	0	342	35	0	0	35	783
Total Volume	517	1044	0	1561	72	0	0	72	738	590	0	1328	149	0	0	149	3110
% App. Total	33.1	66.9	0		100	0	0		55.6	44.4	0		100	0	0		
PHF	.917	.935	.000	.945	.667	.000	.000	.667	.879	.863	.000	.871	.776	.000	.000	.776	.960
Cars	508	1031	0	1539	72	0	0	72	728	570	0	1298	142	0	0	142	3051
% Cars	98.3	98.8	0	98.6	100	0	0	100	98.6	96.6	0	97.7	95.3	0	0	95.3	98.1
Heavy Vehicles	9	13	0	22	0	0	0	0	10	20	0	30	7	0	0	7	59
% Heavy Vehicles	1.7	1.2	0	1.4	0	0	0	0	1.4	3.4	0	2.3	4.7	0	0	4.7	1.9



PRECISION
D A T A
INDUSTRIES, LLC

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N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 A
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

Start Time	Main Street (Route 28) From North			I-95 SB Ramps From East			Main Street (Route 28) From South			I-95 SB Ramps From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	122	212	0	15	0	0	171	87	0	37	0	0	644
07:15 AM	123	257	0	13	0	0	164	96	0	45	0	0	698
07:30 AM	139	256	0	20	0	0	173	124	0	26	0	0	738
07:45 AM	133	275	0	13	0	0	153	141	0	37	0	0	752
Total	517	1000	0	61	0	0	661	448	0	145	0	0	2832
08:00 AM	120	244	0	12	0	0	207	164	0	45	0	0	792
08:15 AM	116	256	0	27	0	0	195	141	0	34	0	0	769
08:30 AM	101	208	0	24	0	0	176	138	0	59	0	0	706
08:45 AM	95	170	0	25	0	0	127	171	0	50	0	0	638
Total	432	878	0	88	0	0	705	614	0	188	0	0	2905
Grand Total	949	1878	0	149	0	0	1366	1062	0	333	0	0	5737
Apprch %	33.6	66.4	0	100	0	0	56.3	43.7	0	100	0	0	
Total %	16.5	32.7	0	2.6	0	0	23.8	18.5	0	5.8	0	0	

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	139	256	0	395	20	0	0	20	173	124	0	297	26	0	0	26	738
07:45 AM	133	275	0	408	13	0	0	13	153	141	0	294	37	0	0	37	752
08:00 AM	120	244	0	364	12	0	0	12	207	164	0	371	45	0	0	45	792
08:15 AM	116	256	0	372	27	0	0	27	195	141	0	336	34	0	0	34	769
Total Volume	508	1031	0	1539	72	0	0	72	728	570	0	1298	142	0	0	142	3051
% App. Total	33	67	0		100	0	0		56.1	43.9	0		100	0	0		
PHF	.914	.937	.000	.943	.667	.000	.000	.667	.879	.869	.000	.875	.789	.000	.000	.789	.963



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N/S: Main Street (Route 28)
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Client: DJK Associates/D. Kelly

File Name : 102371 A
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

Start Time	Main Street (Route 28) From North			I-95 SB Ramps From East			Main Street (Route 28) From South			I-95 SB Ramps From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	1	2	0	1	0	0	3	5	0	0	0	0	12
07:15 AM	1	4	0	0	0	0	3	5	0	1	0	0	14
07:30 AM	2	3	0	0	0	0	4	2	0	1	0	0	12
07:45 AM	1	4	0	0	0	0	3	5	0	2	0	0	15
Total	5	13	0	1	0	0	13	17	0	4	0	0	53
08:00 AM	2	3	0	0	0	0	3	7	0	3	0	0	18
08:15 AM	4	3	0	0	0	0	0	6	0	1	0	0	14
08:30 AM	1	4	0	2	0	0	7	4	0	2	0	0	20
08:45 AM	3	1	0	1	0	0	6	4	0	4	0	0	19
Total	10	11	0	3	0	0	16	21	0	10	0	0	71
Grand Total	15	24	0	4	0	0	29	38	0	14	0	0	124
Apprch %	38.5	61.5	0	100	0	0	43.3	56.7	0	100	0	0	
Total %	12.1	19.4	0	3.2	0	0	23.4	30.6	0	11.3	0	0	

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	2	3	0	5	0	0	0	0	3	7	0	10	3	0	0	3	18
08:15 AM	4	3	0	7	0	0	0	0	0	6	0	6	1	0	0	1	14
08:30 AM	1	4	0	5	2	0	0	2	7	4	0	11	2	0	0	2	20
08:45 AM	3	1	0	4	1	0	0	1	6	4	0	10	4	0	0	4	19
Total Volume	10	11	0	21	3	0	0	3	16	21	0	37	10	0	0	10	71
% App. Total	47.6	52.4	0		100	0	0		43.2	56.8	0		100	0	0		
PHF	.625	.688	.000	.750	.375	.000	.000	.375	.571	.750	.000	.841	.625	.000	.000	.625	.888



PRECISION
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N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 A
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Peds and Bicycles

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
08:30 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
Grand Total	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	4
Apprch %	0	100	0	0	0	0	0	100	0	0	0	0	0	0	0	0	
Total %	0	50	0	0	0	0	0	50	0	0	0	0	0	0	0	0	

	Main Street (Route 28) From North					I-95 SB Ramps From East					Main Street (Route 28) From South					I-95 SB Ramps From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
% App. Total	0	100	0	0		0	0	0	100		0	0	0	0		0	0	0	0		
PHF	.000	.250	.000	.000	.250	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.250



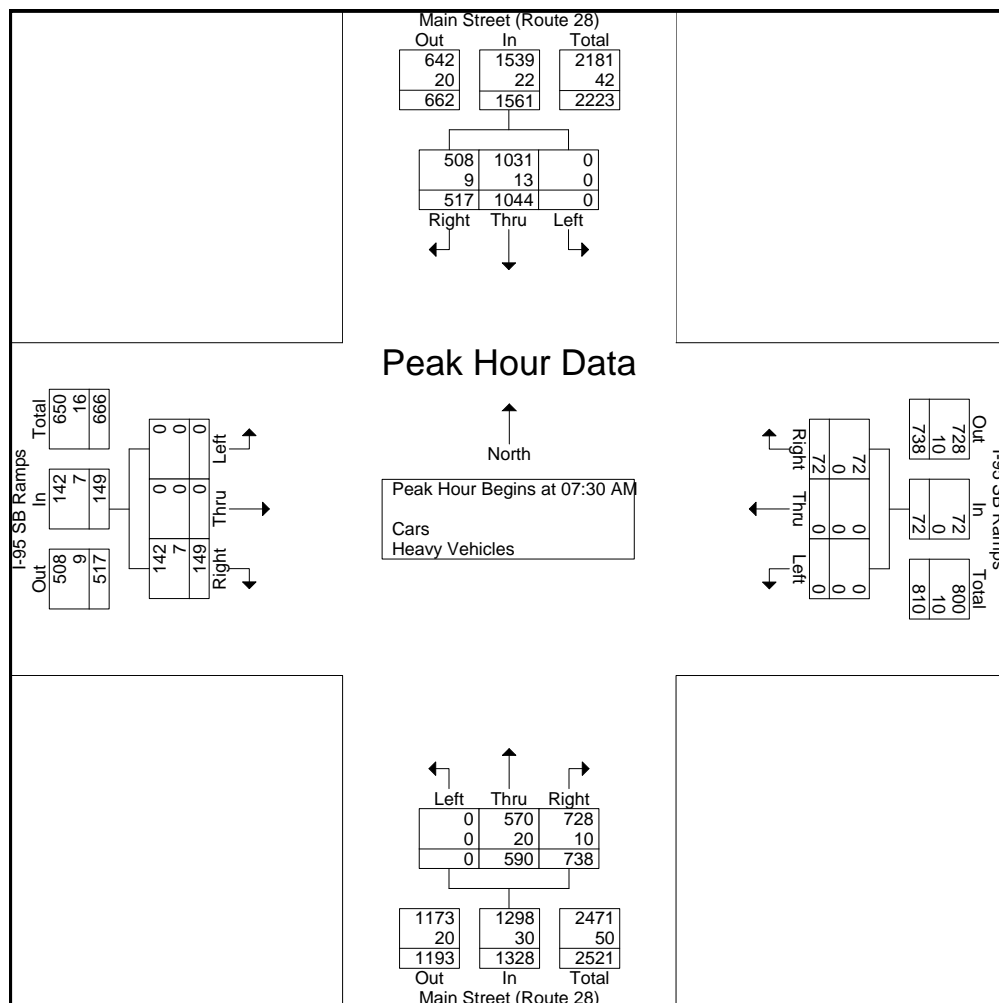
PRECISION
D A T A
INDUSTRIES, LLC

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N/S: Main Street (Route 28)
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Client: DJK Associates/D. Kelly

File Name : 102371 A
Site Code : 809
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	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	141	259	0	400	20	0	0	20	177	126	0	303	27	0	0	27	750
07:45 AM	134	279	0	413	13	0	0	13	156	146	0	302	39	0	0	39	767
08:00 AM	122	247	0	369	12	0	0	12	210	171	0	381	48	0	0	48	810
08:15 AM	120	259	0	379	27	0	0	27	195	147	0	342	35	0	0	35	783
Total Volume	517	1044	0	1561	72	0	0	72	738	590	0	1328	149	0	0	149	3110
% App. Total	33.1	66.9	0		100	0	0		55.6	44.4	0		100	0	0		
PHF	.917	.935	.000	.945	.667	.000	.000	.667	.879	.863	.000	.871	.776	.000	.000	.776	.960
Cars	508	1031	0	1539	72	0	0	72	728	570	0	1298	142	0	0	142	3051
% Cars	98.3	98.8	0	98.6	100	0	0	100	98.6	96.6	0	97.7	95.3	0	0	95.3	98.1
Heavy Vehicles	9	13	0	22	0	0	0	0	10	20	0	30	7	0	0	7	59
% Heavy Vehicles	1.7	1.2	0	1.4	0	0	0	0	1.4	3.4	0	2.3	4.7	0	0	4.7	1.9





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
Office: 508.481.3999 Fax: 508.545.1234
Email: datarequests@pdillc.com

N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 AA
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			I-95 SB Ramps From East			Main Street (Route 28) From South			I-95 SB Ramps From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	55	134	0	38	0	0	101	178	0	56	0	0	562
04:15 PM	59	118	0	38	0	0	92	200	0	68	0	0	575
04:30 PM	65	135	0	41	0	0	107	220	0	55	0	0	623
04:45 PM	59	113	0	33	0	0	102	197	0	55	0	0	559
Total	238	500	0	150	0	0	402	795	0	234	0	0	2319
05:00 PM	78	162	0	50	0	0	121	210	0	59	0	0	680
05:15 PM	65	134	0	49	0	0	101	221	0	85	0	0	655
05:30 PM	58	118	0	50	0	0	81	257	0	69	0	0	633
05:45 PM	34	101	0	40	0	0	42	156	0	64	0	0	437
Total	235	515	0	189	0	0	345	844	0	277	0	0	2405
Grand Total	473	1015	0	339	0	0	747	1639	0	511	0	0	4724
Apprch %	31.8	68.2	0	100	0	0	31.3	68.7	0	100	0	0	
Total %	10	21.5	0	7.2	0	0	15.8	34.7	0	10.8	0	0	
Cars	467	1007	0	334	0	0	738	1634	0	506	0	0	4686
% Cars	98.7	99.2	0	98.5	0	0	98.8	99.7	0	99	0	0	99.2
Heavy Vehicles	6	8	0	5	0	0	9	5	0	5	0	0	38
% Heavy Vehicles	1.3	0.8	0	1.5	0	0	1.2	0.3	0	1	0	0	0.8

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	59	113	0	172	33	0	0	33	102	197	0	299	55	0	0	55	559
05:00 PM	78	162	0	240	50	0	0	50	121	210	0	331	59	0	0	59	680
05:15 PM	65	134	0	199	49	0	0	49	101	221	0	322	85	0	0	85	655
05:30 PM	58	118	0	176	50	0	0	50	81	257	0	338	69	0	0	69	633
Total Volume	260	527	0	787	182	0	0	182	405	885	0	1290	268	0	0	268	2527
% App. Total	33	67	0		100	0	0		31.4	68.6	0		100	0	0		
PHF	.833	.813	.000	.820	.910	.000	.000	.910	.837	.861	.000	.954	.788	.000	.000	.788	.929
Cars	255	524	0	779	178	0	0	178	401	882	0	1283	267	0	0	267	2507
% Cars	98.1	99.4	0	99.0	97.8	0	0	97.8	99.0	99.7	0	99.5	99.6	0	0	99.6	99.2
Heavy Vehicles	5	3	0	8	4	0	0	4	4	3	0	7	1	0	0	1	20
% Heavy Vehicles	1.9	0.6	0	1.0	2.2	0	0	2.2	1.0	0.3	0	0.5	0.4	0	0	0.4	0.8



PRECISION
D A T A
INDUSTRIES, LLC

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N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 AA
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

Start Time	Main Street (Route 28) From North			I-95 SB Ramps From East			Main Street (Route 28) From South			I-95 SB Ramps From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	55	132	0	38	0	0	100	177	0	54	0	0	556
04:15 PM	59	118	0	37	0	0	89	199	0	67	0	0	569
04:30 PM	64	134	0	41	0	0	106	220	0	54	0	0	619
04:45 PM	57	113	0	33	0	0	101	195	0	54	0	0	553
Total	235	497	0	149	0	0	396	791	0	229	0	0	2297
05:00 PM	76	161	0	47	0	0	121	210	0	59	0	0	674
05:15 PM	65	133	0	48	0	0	100	221	0	85	0	0	652
05:30 PM	57	117	0	50	0	0	79	256	0	69	0	0	628
05:45 PM	34	99	0	40	0	0	42	156	0	64	0	0	435
Total	232	510	0	185	0	0	342	843	0	277	0	0	2389
Grand Total	467	1007	0	334	0	0	738	1634	0	506	0	0	4686
Apprch %	31.7	68.3	0	100	0	0	31.1	68.9	0	100	0	0	
Total %	10	21.5	0	7.1	0	0	15.7	34.9	0	10.8	0	0	

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	57	113	0	170	33	0	0	33	101	195	0	296	54	0	0	54	553
05:00 PM	76	161	0	237	47	0	0	47	121	210	0	331	59	0	0	59	674
05:15 PM	65	133	0	198	48	0	0	48	100	221	0	321	85	0	0	85	652
05:30 PM	57	117	0	174	50	0	0	50	79	256	0	335	69	0	0	69	628
Total Volume	255	524	0	779	178	0	0	178	401	882	0	1283	267	0	0	267	2507
% App. Total	32.7	67.3	0		100	0	0		31.3	68.7	0		100	0	0		
PHF	.839	.814	.000	.822	.890	.000	.000	.890	.829	.861	.000	.957	.785	.000	.000	.785	.930



PRECISION
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N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 AA
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			I-95 SB Ramps From East			Main Street (Route 28) From South			I-95 SB Ramps From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	0	2	0	0	0	0	1	1	0	2	0	0	6
04:15 PM	0	0	0	1	0	0	3	1	0	1	0	0	6
04:30 PM	1	1	0	0	0	0	1	0	0	1	0	0	4
04:45 PM	2	0	0	0	0	0	1	2	0	1	0	0	6
Total	3	3	0	1	0	0	6	4	0	5	0	0	22
05:00 PM	2	1	0	3	0	0	0	0	0	0	0	0	6
05:15 PM	0	1	0	1	0	0	1	0	0	0	0	0	3
05:30 PM	1	1	0	0	0	0	2	1	0	0	0	0	5
05:45 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
Total	3	5	0	4	0	0	3	1	0	0	0	0	16
Grand Total	6	8	0	5	0	0	9	5	0	5	0	0	38
Apprch %	42.9	57.1	0	100	0	0	64.3	35.7	0	100	0	0	
Total %	15.8	21.1	0	13.2	0	0	23.7	13.2	0	13.2	0	0	

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	2	0	2	0	0	0	0	1	1	0	2	2	0	0	2	6
04:15 PM	0	0	0	0	1	0	0	1	3	1	0	4	1	0	0	1	6
04:30 PM	1	1	0	2	0	0	0	0	1	0	0	1	1	0	0	1	4
04:45 PM	2	0	0	2	0	0	0	0	1	2	0	3	1	0	0	1	6
Total Volume	3	3	0	6	1	0	0	1	6	4	0	10	5	0	0	5	22
% App. Total	50	50	0		100	0	0		60	40	0		100	0	0		
PHF	.375	.375	.000	.750	.250	.000	.000	.250	.500	.500	.000	.625	.625	.000	.000	.625	.917



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N/S: Main Street (Route 28)
E/W: I-95 SB Ramps
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 AA
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Peds and Bicycles

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %																	

	Main Street (Route 28) From North					I-95 SB Ramps From East					Main Street (Route 28) From South					I-95 SB Ramps From West					Int. Total
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



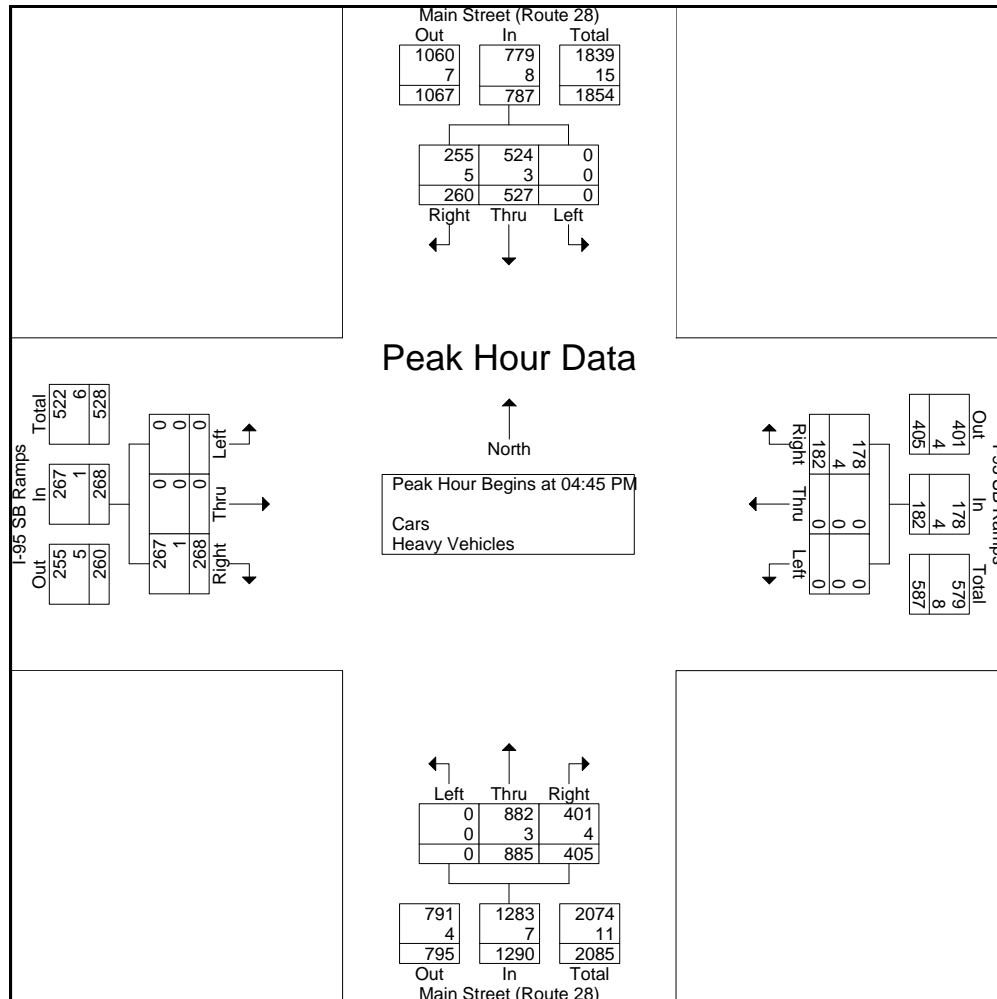
PRECISION
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N/S: Main Street (Route 28)
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File Name : 102371 AA
Site Code : 809
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Page No : 1

	Main Street (Route 28) From North				I-95 SB Ramps From East				Main Street (Route 28) From South				I-95 SB Ramps From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	59	113	0	172	33	0	0	33	102	197	0	299	55	0	0	55	559
05:00 PM	78	162	0	240	50	0	0	50	121	210	0	331	59	0	0	59	680
05:15 PM	65	134	0	199	49	0	0	49	101	221	0	322	85	0	0	85	655
05:30 PM	58	118	0	176	50	0	0	50	81	257	0	338	69	0	0	69	633
Total Volume	260	527	0	787	182	0	0	182	405	885	0	1290	268	0	0	268	2527
% App. Total	33	67	0		100	0	0		31.4	68.6	0		100	0	0		
PHF	.833	.813	.000	.820	.910	.000	.000	.910	.837	.861	.000	.954	.788	.000	.000	.788	.929
Cars	255	524	0	779	178	0	0	178	401	882	0	1283	267	0	0	267	2507
% Cars	98.1	99.4	0	99.0	97.8	0	0	97.8	99.0	99.7	0	99.5	99.6	0	0	99.6	99.2
Heavy Vehicles	5	3	0	8	4	0	0	4	4	3	0	7	1	0	0	1	20
% Heavy Vehicles	1.9	0.6	0	1.0	2.2	0	0	2.2	1.0	0.3	0	0.5	0.4	0	0	0.4	0.8





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N/S: Main Street (Route 28)

E/W: South Street

City, State: Reading, MA

Client: DJK Associates/D. Kelly

File Name : 102371 B

Site Code : 809

Start Date : 11/4/2010

Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			South Street From East			Main Street (Route 28) From South				South Street From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	
07:00 AM	10	282	4	10	9	20	3	90	11	1	23	2	8	473
07:15 AM	15	325	3	8	20	33	1	90	21	0	22	2	6	546
07:30 AM	15	331	4	11	16	47	0	107	23	3	25	0	5	587
07:45 AM	15	337	4	10	16	46	5	126	35	1	16	6	4	621
Total	55	1275	15	39	61	146	9	413	90	5	86	10	23	2227
08:00 AM	18	296	11	10	27	35	6	146	20	2	17	2	3	593
08:15 AM	15	310	4	5	21	23	0	132	24	3	20	6	3	566
08:30 AM	16	241	5	7	17	33	3	122	25	3	18	2	9	501
08:45 AM	6	209	7	9	9	20	6	168	20	1	14	6	5	480
Total	55	1056	27	31	74	111	15	568	89	9	69	16	20	2140
Grand Total	110	2331	42	70	135	257	24	981	179	14	155	26	43	4367
Apprch %	4.4	93.9	1.7	15.2	29.2	55.6	2	81.9	14.9	1.2	69.2	11.6	19.2	
Total %	2.5	53.4	1	1.6	3.1	5.9	0.5	22.5	4.1	0.3	3.5	0.6	1	
Cars	109	2300	42	70	135	254	24	940	176	14	152	26	43	4285
% Cars	99.1	98.7	100	100	100	98.8	100	95.8	98.3	100	98.1	100	100	98.1
Heavy Vehicles	1	31	0	0	0	3	0	41	3	0	3	0	0	82
% Heavy Vehicles	0.9	1.3	0	0	0	1.2	0	4.2	1.7	0	1.9	0	0	1.9

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 07:30 AM																		
07:30 AM	15	331	4	350	11	16	47	74	0	107	23	3	133	25	0	5	30	587
07:45 AM	15	337	4	356	10	16	46	72	5	126	35	1	167	16	6	4	26	621
08:00 AM	18	296	11	325	10	27	35	72	6	146			174	17	2	3	22	593
08:15 AM	15	310	4	329	5	21	23	49	0	132	24	3	159	20	6	3	29	566
Total Volume	63	1274	23	1360	36	80	151	267	11	511	102	9	633	78	14	15	107	2367
% App. Total	4.6	93.7	1.7		13.5	30	56.6		1.7	80.7	16.1	1.4		72.9	13.1	14		
PHF	.875	.945	.523	.955	.818	.741	.803	.902	.458	.875	.729	.750	.909	.780	.583	.750	.892	.953
Cars	62	1256	23	1341	36	80	149	265	11	492	100	9	612	77	14	15	106	2324
% Cars	98.4	98.6	100	98.6	100	100	98.7	99.3	100	96.3	98.0	100	96.7	98.7	100	100	99.1	98.2
Heavy Vehicles	1	18	0	19	0	0	2	2	0	19	2	0	21	1	0	0	1	43
% Heavy Vehicles	1.6	1.4	0	1.4	0	0	1.3	0.7	0	3.7	2.0	0	3.3	1.3	0	0	0.9	1.8



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N/S: Main Street (Route 28)
E/W: South Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 B
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

Start Time	Main Street (Route 28) From North			South Street From East			Main Street (Route 28) From South				South Street From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	
07:00 AM	10	279	4	10	9	20	3	84	11	1	23	2	8	464
07:15 AM	15	323	3	8	20	33	1	85	21	0	21	2	6	538
07:30 AM	15	327	4	11	16	46	0	105	23	3	25	0	5	580
07:45 AM	15	330	4	10	16	46	5	122	34	1	16	6	4	609
Total	55	1259	15	39	61	145	9	396	89	5	85	10	23	2191
08:00 AM	18	294	11	10	27	34	6	139	19	2	17	2	3	582
08:15 AM	14	305	4	5	21	23	0	126	24	3	19	6	3	553
08:30 AM	16	238	5	7	17	32	3	116	25	3	17	2	9	490
08:45 AM	6	204	7	9	9	20	6	163	19	1	14	6	5	469
Total	54	1041	27	31	74	109	15	544	87	9	67	16	20	2094
Grand Total	109	2300	42	70	135	254	24	940	176	14	152	26	43	4285
Apprch %	4.4	93.8	1.7	15.3	29.4	55.3	2.1	81.5	15.3	1.2	68.8	11.8	19.5	
Total %	2.5	53.7	1	1.6	3.2	5.9	0.6	21.9	4.1	0.3	3.5	0.6	1	

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 07:30 AM																		
07:30 AM	15	327	4	346	11	16	46	73	0	105	23	3	131	25	0	5	30	580
07:45 AM	15	330	4	349	10	16	46	72	5	122	34	1	162	16	6	4	26	609
08:00 AM	18	294	11	323	10	27	34	71	6	139			166	17	2	3	22	582
08:15 AM	14	305	4	323	5	21	23	49	0	126	24	3	153	19	6	3	28	553
Total Volume	62	1256	23	1341	36	80	149	265	11	492	100	9	612	77	14	15	106	2324
% App. Total	4.6	93.7	1.7		13.6	30.2	56.2		1.8	80.4	16.3	1.5		72.6	13.2	14.2		
PHF	.861	.952	.523	.961	.818	.741	.810	.908	.458	.885	.735	.750	.922	.770	.583	.750	.883	.954



PRECISION
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N/S: Main Street (Route 28)
E/W: South Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 B
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			South Street From East			Main Street (Route 28) From South				South Street From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	
07:00 AM	0	3	0	0	0	0	0	6	0	0	0	0	0	9
07:15 AM	0	2	0	0	0	0	0	5	0	0	1	0	0	8
07:30 AM	0	4	0	0	0	1	0	2	0	0	0	0	0	7
07:45 AM	0	7	0	0	0	0	0	4	1	0	0	0	0	12
Total	0	16	0	0	0	1	0	17	1	0	1	0	0	36
08:00 AM	0	2	0	0	0	1	0	7	1	0	0	0	0	11
08:15 AM	1	5	0	0	0	0	0	6	0	0	1	0	0	13
08:30 AM	0	3	0	0	0	1	0	6	0	0	1	0	0	11
08:45 AM	0	5	0	0	0	0	0	5	1	0	0	0	0	11
Total	1	15	0	0	0	2	0	24	2	0	2	0	0	46
Grand Total	1	31	0	0	0	3	0	41	3	0	3	0	0	82
Apprch %	3.1	96.9	0	0	0	100	0	93.2	6.8	0	100	0	0	
Total %	1.2	37.8	0	0	0	3.7	0	50	3.7	0	3.7	0	0	

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 07:45 AM																		
07:45 AM	0	7	0	7	0	0	0	0	0	4	1	0	5	0	0	0	0	12
08:00 AM	0	2	0	2	0	0	1	1	0	7			8	0	0	0	0	11
08:15 AM	1	5	0	6	0	0	0	0	0	6	0	0	6	1	0	0	1	13
08:30 AM	0	3	0	3	0	0	1	1	0	6	0	0	6	1	0	0	1	11
Total Volume	1	17	0	18	0	0	2	2	0	23	2	0	25	2	0	0	2	47
% App. Total	5.6	94.4	0		0	0	100		0	92	8	0		100	0	0		
PHF	.250	.607	.000	.643	.000	.000	.500	.500	.000	.821	.500	.000	.781	.500	.000	.000	.500	.904



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Page No : 1

Groups Printed- Peds and Bicycles

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South				South Street From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
08:00 AM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	4
Grand Total	0	1	0	1	0	1	0	2	0	0	0	0	1	0	0	0	6
Apprch %	0	50	0	50	0	33.3	0	66.7	0	0	0	0	100	0	0	0	
Total %	0	16.7	0	16.7	0	16.7	0	33.3	0	0	0	0	16.7	0	0	0	

	Main Street (Route 28) From North					South Street From East					Main Street (Route 28) From South					South Street From West					Int. Total
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Total Volume	0	0	0	1	1	0	1	0	1	2	0	0	0	0	0	1	0	0	0	1	4
% App. Total	0	0	0	100		0	50	0	50		0	0	0	0		100	0	0	0		
PHF	.000	.000	.000	.250	.250	.000	.250	.000	.250	.500	.000	.000	.000	.000	.000	.250	.000	.000	.000	.250	.500



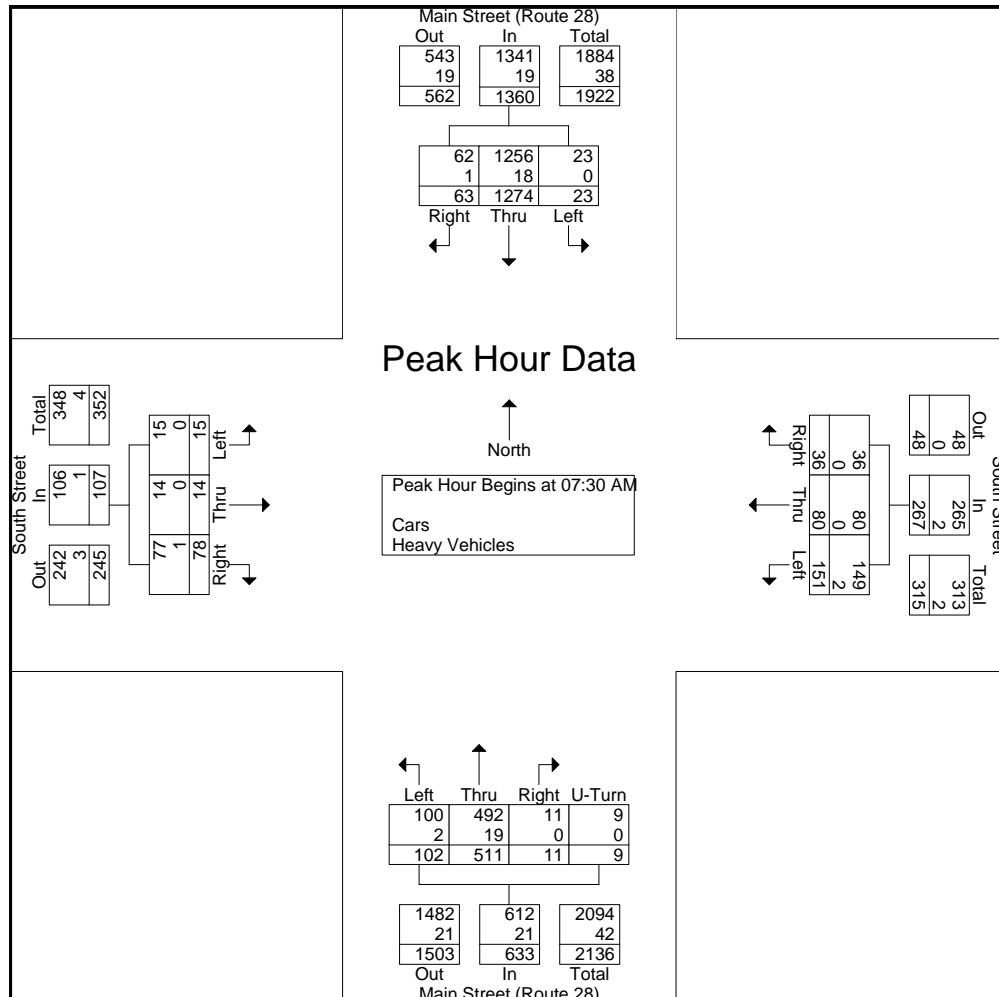
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	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 07:30 AM																		
07:30 AM	15	331	4	350	11	16	47	74	0	107	23	3	133	25	0	5	30	587
07:45 AM	15	337	4	356	10	16	46	72	5	126	35	1	167	16	6	4	26	621
08:00 AM	18	296	11	325	10	27	35	72	6	146			174	17	2	3	22	593
08:15 AM	15	310	4	329	5	21	23	49	0	132	24	3	159	20	6	3	29	566
Total Volume	63	1274	23	1360	36	80	151	267	11	511	102	9	633	78	14	15	107	2367
% App. Total	4.6	93.7	1.7		13.5	30	56.6		1.7	80.7	16.1	1.4		72.9	13.1	14		
PHF	.875	.945	.523	.955	.818	.741	.803	.902	.458	.875	.729	.750	.909	.780	.583	.750	.892	.953
Cars	62	1256	23	1341	36	80	149	265	11	492	100	9	612	77	14	15	106	2324
% Cars	98.4	98.6	100	98.6	100	100	98.7	99.3	100	96.3	98.0	100	96.7	98.7	100	100	99.1	98.2
Heavy Vehicles	1	18	0	19	0	0	2	2	0	19	2	0	21	1	0	0	1	43
% Heavy Vehicles	1.6	1.4	0	1.4	0	0	1.3	0.7	0	3.7	2.0	0	3.3	1.3	0	0	0.9	1.8





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Client: DJK Associates/D. Kelly

File Name : 102371 BB

Site Code : 809

Start Date : 11/4/2010

Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			South Street From East			Main Street (Route 28) From South				South Street From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	
04:00 PM	4	157	2	2	3	6	9	188	8	0	24	14	10	427
04:15 PM	10	141	4	1	4	8	5	212	14	0	21	10	9	439
04:30 PM	7	154	5	2	2	11	12	206	18	0	30	12	10	469
04:45 PM	8	130	5	4	1	12	7	208	19	1	20	8	5	428
Total	29	582	16	9	10	37	33	814	59	1	95	44	34	1763
05:00 PM	6	192	4	5	0	11	6	228	8	0	31	16	4	511
05:15 PM	5	161	4	6	6	15	7	232	17	0	32	10	14	509
05:30 PM	9	151	8	5	7	12	11	247	24	0	16	15	6	511
05:45 PM	17	162	6	3	1	12	8	254	16	0	20	17	5	521
Total	37	666	22	19	14	50	32	961	65	0	99	58	29	2052
Grand Total	66	1248	38	28	24	87	65	1775	124	1	194	102	63	3815
Apprch %	4.9	92.3	2.8	20.1	17.3	62.6	3.3	90.3	6.3	0.1	54	28.4	17.5	
Total %	1.7	32.7	1	0.7	0.6	2.3	1.7	46.5	3.3	0	5.1	2.7	1.7	
Cars	65	1235	38	28	24	87	64	1767	124	1	193	102	63	3791
% Cars	98.5	99	100	100	100	100	98.5	99.5	100	100	99.5	100	100	99.4
Heavy Vehicles	1	13	0	0	0	0	1	8	0	0	1	0	0	24
% Heavy Vehicles	1.5	1	0	0	0	0	1.5	0.5	0	0	0.5	0	0	0.6

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 05:00 PM																		
05:00 PM	6	192	4	202	5	0	11	16	6	228	8	0	242	31	16	4	51	511
05:15 PM	5	161	4	170	6	6	15	27	7	232	17	0	256	32	10	14	56	509
05:30 PM	9	151	8	168	5	7	12	24	11	247	24	0	282	16	15	6	37	511
05:45 PM	17	162	6	185	3	1	12	16	8	254				17	5	42	521	
Total Volume	37	666	22	725	19	14	50	83	32	961	65	0	1058	99	58	29	186	2052
% App. Total	5.1	91.9	3		22.9	16.9	60.2		3	90.8	6.1	0		53.2	31.2	15.6		
PHF	.544	.867	.688	.897	.792	.500	.833	.769	.727	.946	.677	.000	.938	.773	.853	.518	.830	.985
Cars	37	657	22	716	19	14	50	83	31	958	65	0	1054	99	58	29	186	2039
% Cars	100	98.6	100	98.8	100	100	100	100	96.9	99.7	100	0	99.6	100	100	100	100	99.4
Heavy Vehicles	0	9	0	9	0	0	0	0	1	3	0	0	4	0	0	0	0	13
% Heavy Vehicles	0	1.4	0	1.2	0	0	0	0	3.1	0.3	0	0	0.4	0	0	0	0	0.6



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File Name : 102371 BB
Site Code : 809
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Page No : 1

Groups Printed- Cars

	Main Street (Route 28) From North			South Street From East			Main Street (Route 28) From South				South Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Int. Total
04:00 PM	4	156	2	2	3	6	9	187	8	0	23	14	10	424
04:15 PM	10	141	4	1	4	8	5	210	14	0	21	10	9	437
04:30 PM	6	153	5	2	2	11	12	206	18	0	30	12	10	467
04:45 PM	8	128	5	4	1	12	7	206	19	1	20	8	5	424
Total	28	578	16	9	10	37	33	809	59	1	94	44	34	1752
05:00 PM	6	189	4	5	0	11	6	226	8	0	31	16	4	506
05:15 PM	5	160	4	6	6	15	6	232	17	0	32	10	14	507
05:30 PM	9	149	8	5	7	12	11	246	24	0	16	15	6	508
05:45 PM	17	159	6	3	1	12	8	254	16	0	20	17	5	518
Total	37	657	22	19	14	50	31	958	65	0	99	58	29	2039
Grand Total	65	1235	38	28	24	87	64	1767	124	1	193	102	63	3791
Apprch %	4.9	92.3	2.8	20.1	17.3	62.6	3.3	90.3	6.3	0.1	53.9	28.5	17.6	
Total %	1.7	32.6	1	0.7	0.6	2.3	1.7	46.6	3.3	0	5.1	2.7	1.7	

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 05:00 PM																		
05:00 PM	6	189	4	199	5	0	11	16	6	226	8	0	240	31	16	4	51	506
05:15 PM	5	160	4	169	6	6	15	27	6	232	17	0	255	32	10	14	56	507
05:30 PM	9	149	8	166	5	7	12	24	11	246	24	0	281	16	15	6	37	508
05:45 PM	17	159	6	182	3	1	12	16	8	254					17	5	42	518
Total Volume	37	657	22	716	19	14	50	83	31	958	65	0	1054	99	58	29	186	2039
% App. Total	5.2	91.8	3.1		22.9	16.9	60.2		2.9	90.9	6.2	0		53.2	31.2	15.6		
PHF	.544	.869	.688	.899	.792	.500	.833	.769	.705	.943	.677	.000	.938	.773	.853	.518	.830	.984



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Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			South Street From East			Main Street (Route 28) From South				South Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	U-Turn	Right	Thru	Left	Int. Total
04:00 PM	0	1	0	0	0	0	0	1	0	0	1	0	0	3
04:15 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	2
04:30 PM	1	1	0	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	0	2	0	0	0	0	0	2	0	0	0	0	0	4
Total	1	4	0	0	0	0	0	5	0	0	1	0	0	11
05:00 PM	0	3	0	0	0	0	0	2	0	0	0	0	0	5
05:15 PM	0	1	0	0	0	0	1	0	0	0	0	0	0	2
05:30 PM	0	2	0	0	0	0	0	1	0	0	0	0	0	3
05:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	9	0	0	0	0	1	3	0	0	0	0	0	13
Grand Total	1	13	0	0	0	0	1	8	0	0	1	0	0	24
Apprch %	7.1	92.9	0	0	0	0	11.1	88.9	0	0	100	0	0	
Total %	4.2	54.2	0	0	0	0	4.2	33.3	0	0	4.2	0	0	

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 04:45 PM																		
04:45 PM	0	2	0	2	0	0	0	0	0	2	0	0	2	0	0	0	0	4
05:00 PM	0	3	0	3	0	0	0	0	0	2	0	0	2	0	0	0	0	5
05:15 PM	0	1	0	1	0	0	0	0	1	0	0	0	1	0	0	0	0	2
05:30 PM	0	2	0	2	0	0	0	0	0	1	0	0	1	0	0	0	0	3
Total Volume	0	8	0	8	0	0	0	0	1	5	0	0	6	0	0	0	0	14
% App. Total	0	100	0		0	0	0		16.7	83.3	0	0		0	0	0		
PHF	.000	.667	.000	.667	.000	.000	.000	.000	.250	.625	.000	.000	.750	.000	.000	.000	.000	.700



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Groups Printed- Peds and Bicycles

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South				South Street From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %																	

	Main Street (Route 28) From North					South Street From East					Main Street (Route 28) From South					South Street From West					Int. Total
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



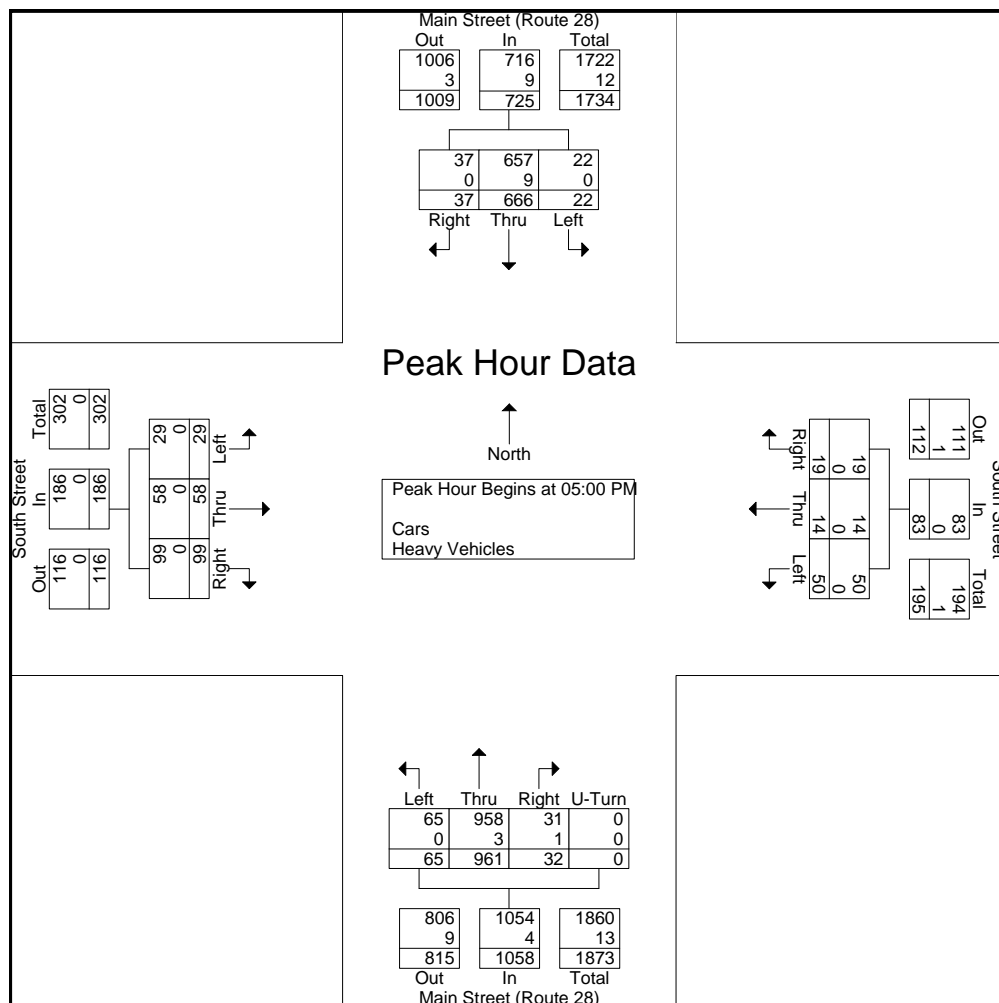
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N/S: Main Street (Route 28)
E/W: South Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 BB
Site Code : 809
Start Date : 11/4/2010
Page No : 1

	Main Street (Route 28) From North				South Street From East				Main Street (Route 28) From South					South Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	U-Turn	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																		
Peak Hour for Entire Intersection Begins at 05:00 PM																		
05:00 PM	6	192	4	202	5	0	11	16	6	228	8	0	242	31	16	4	51	511
05:15 PM	5	161	4	170	6	6	15	27	7	232	17	0	256	32	10	14	56	509
05:30 PM	9	151	8	168	5	7	12	24	11	247	24	0	282	16	15	6	37	511
05:45 PM	17	162	6	185	3	1	12	16	8	254					17	5	42	521
Total Volume	37	666	22	725	19	14	50	83	32	961	65	0	1058	99	58	29	186	2052
% App. Total	5.1	91.9	3		22.9	16.9	60.2		3	90.8	6.1	0		53.2	31.2	15.6		
PHF	.544	.867	.688	.897	.792	.500	.833	.769	.727	.946	.677	.000	.938	.773	.853	.518	.830	.985
Cars	37	657	22	716	19	14	50	83	31	958	65	0	1054	99	58	29	186	2039
% Cars	100	98.6	100	98.8	100	100	100	100	96.9	99.7	100	0	99.6	100	100	100	100	99.4
Heavy Vehicles	0	9	0	9	0	0	0	0	1	3	0	0	4	0	0	0	0	13
% Heavy Vehicles	0	1.4	0	1.2	0	0	0	0	3.1	0.3	0	0	0.4	0	0	0	0	0.6





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N/S: West Street/Washington Street
E/W: South Street/Condo Complex Driveway
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 C
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	West Street From North			South Street From East			Washington Street From South			Condo Complex Driveway From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	0	216	1	4	0	38	11	28	5	7	0	5	315
07:15 AM	0	247	4	5	2	61	8	55	3	25	2	5	417
07:30 AM	0	238	1	2	1	65	5	46	5	13	1	8	385
07:45 AM	0	236	0	8	2	84	15	80	4	19	0	7	455
Total	0	937	6	19	5	248	39	209	17	64	3	25	1572
08:00 AM	0	226	1	3	0	86	8	56	1	15	2	8	406
08:15 AM	0	232	3	4	0	87	3	56	1	4	0	5	395
08:30 AM	0	204	4	4	2	71	13	60	3	5	1	1	368
08:45 AM	0	189	1	4	0	45	8	60	3	8	3	1	322
Total	0	851	9	15	2	289	32	232	8	32	6	15	1491
Grand Total	0	1788	15	34	7	537	71	441	25	96	9	40	3063
Apprch %	0	99.2	0.8	5.9	1.2	92.9	13.2	82.1	4.7	66.2	6.2	27.6	
Total %	0	58.4	0.5	1.1	0.2	17.5	2.3	14.4	0.8	3.1	0.3	1.3	
Cars	0	1765	15	34	7	533	67	427	25	96	9	40	3018
% Cars	0	98.7	100	100	100	99.3	94.4	96.8	100	100	100	100	98.5
Heavy Vehicles	0	23	0	0	0	4	4	14	0	0	0	0	45
% Heavy Vehicles	0	1.3	0	0	0	0.7	5.6	3.2	0	0	0	0	1.5

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	247	4	251	5	2	61	68	8	55	3	66	25	2	5	32	417
07:30 AM	0	238	1	239	2	1	65	68	5	46	5	56	13	1	8	22	385
07:45 AM	0	236	0	236	8	2	84	94	15	80	4	99	19	0	7	26	455
08:00 AM	0	226	1	227	3	0	86	89	8	56	1	65	15	2	8	25	406
Total Volume	0	947	6	953	18	5	296	319	36	237	13	286	72	5	28	105	1663
% App. Total	0	99.4	0.6		5.6	1.6	92.8		12.6	82.9	4.5		68.6	4.8	26.7		
PHF	.000	.959	.375	.949	.563	.625	.860	.848	.600	.741	.650	.722	.720	.625	.875	.820	.914
Cars	0	933	6	939	18	5	294	317	34	227	13	274	72	5	28	105	1635
% Cars	0	98.5	100	98.5	100	100	99.3	99.4	94.4	95.8	100	95.8	100	100	100	100	98.3
Heavy Vehicles	0	14	0	14	0	0	2	2	2	10	0	12	0	0	0	0	28
% Heavy Vehicles	0	1.5	0	1.5	0	0	0.7	0.6	5.6	4.2	0	4.2	0	0	0	0	1.7



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E/W: South Street/Condo Complex Driveway
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 C
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

Start Time	West Street From North			South Street From East			Washington Street From South			Condo Complex Driveway From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	0	213	1	4	0	38	11	27	5	7	0	5	311
07:15 AM	0	240	4	5	2	60	7	54	3	25	2	5	407
07:30 AM	0	233	1	2	1	64	5	45	5	13	1	8	378
07:45 AM	0	235	0	8	2	84	14	72	4	19	0	7	445
Total	0	921	6	19	5	246	37	198	17	64	3	25	1541
08:00 AM	0	225	1	3	0	86	8	56	1	15	2	8	405
08:15 AM	0	231	3	4	0	85	3	54	1	4	0	5	390
08:30 AM	0	203	4	4	2	71	11	60	3	5	1	1	365
08:45 AM	0	185	1	4	0	45	8	59	3	8	3	1	317
Total	0	844	9	15	2	287	30	229	8	32	6	15	1477
Grand Total	0	1765	15	34	7	533	67	427	25	96	9	40	3018
Apprch %	0	99.2	0.8	5.9	1.2	92.9	12.9	82.3	4.8	66.2	6.2	27.6	
Total %	0	58.5	0.5	1.1	0.2	17.7	2.2	14.1	0.8	3.2	0.3	1.3	

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	240	4	244	5	2	60	67	7	54	3	64	25	2	5	32	407
07:30 AM	0	233	1	234	2	1	64	67	5	45	5	55	13	1	8	22	378
07:45 AM	0	235	0	235	8	2	84	94	14	72	4	90	19	0	7	26	445
08:00 AM	0	225	1	226	3	0	86	89	8	56	1	65	15	2	8	25	405
Total Volume	0	933	6	939	18	5	294	317	34	227	13	274	72	5	28	105	1635
% App. Total	0	99.4	0.6		5.7	1.6	92.7		12.4	82.8	4.7		68.6	4.8	26.7		
PHF	.000	.972	.375	.962	.563	.625	.855	.843	.607	.788	.650	.761	.720	.625	.875	.820	.919



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File Name : 102371 C
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

	West Street From North			South Street From East			Washington Street From South			Condo Complex Driveway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	0	3	0	0	0	0	0	1	0	0	0	0	4
07:15 AM	0	7	0	0	0	1	1	1	0	0	0	0	10
07:30 AM	0	5	0	0	0	1	0	1	0	0	0	0	7
07:45 AM	0	1	0	0	0	0	1	8	0	0	0	0	10
Total	0	16	0	0	0	2	2	11	0	0	0	0	31
08:00 AM	0	1	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	1	0	0	0	2	0	2	0	0	0	0	5
08:30 AM	0	1	0	0	0	0	2	0	0	0	0	0	3
08:45 AM	0	4	0	0	0	0	0	1	0	0	0	0	5
Total	0	7	0	0	0	2	2	3	0	0	0	0	14
Grand Total	0	23	0	0	0	4	4	14	0	0	0	0	45
Apprch %	0	100	0	0	0	100	22.2	77.8	0	0	0	0	
Total %	0	51.1	0	0	0	8.9	8.9	31.1	0	0	0	0	

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	3	0	3	0	0	0	0	0	1	0	1	0	0	0	0	4
07:15 AM	0	7	0	7	0	0	1	1	1	1	0	2	0	0	0	0	10
07:30 AM	0	5	0	5	0	0	1	1	0	1	0	1	0	0	0	0	7
07:45 AM	0	1	0	1	0	0	0	0	1	8	0	9	0	0	0	0	10
Total Volume	0	16	0	16	0	0	2	2	2	11	0	13	0	0	0	0	31
% App. Total	0	100	0		0	0	100		15.4	84.6	0		0	0	0		
PHF	.000	.571	.000	.571	.000	.000	.500	.500	.500	.344	.000	.361	.000	.000	.000	.000	.775



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City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 C
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Peds and Bicycles

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	4
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0	5
08:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	4
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	3	5
Grand Total	0	0	0	2	0	0	0	4	0	0	0	1	0	0	0	3	10
Apprch %	0	0	0	100	0	0	0	100	0	0	0	100	0	0	0	100	
Total %	0	0	0	20	0	0	0	40	0	0	0	10	0	0	0	30	

	West Street From North					South Street From East					Washington Street From South					Condo Complex Driveway From West					Int. Total
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
08:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	4
Total Volume	0	0	0	2	2	0	0	0	1	1	0	0	0	0	0	0	0	0	3	3	6
% App. Total	0	0	0	100		0	0	0	100		0	0	0	0		0	0	0	100		
PHF	.000	.000	.000	.500	.500	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.375



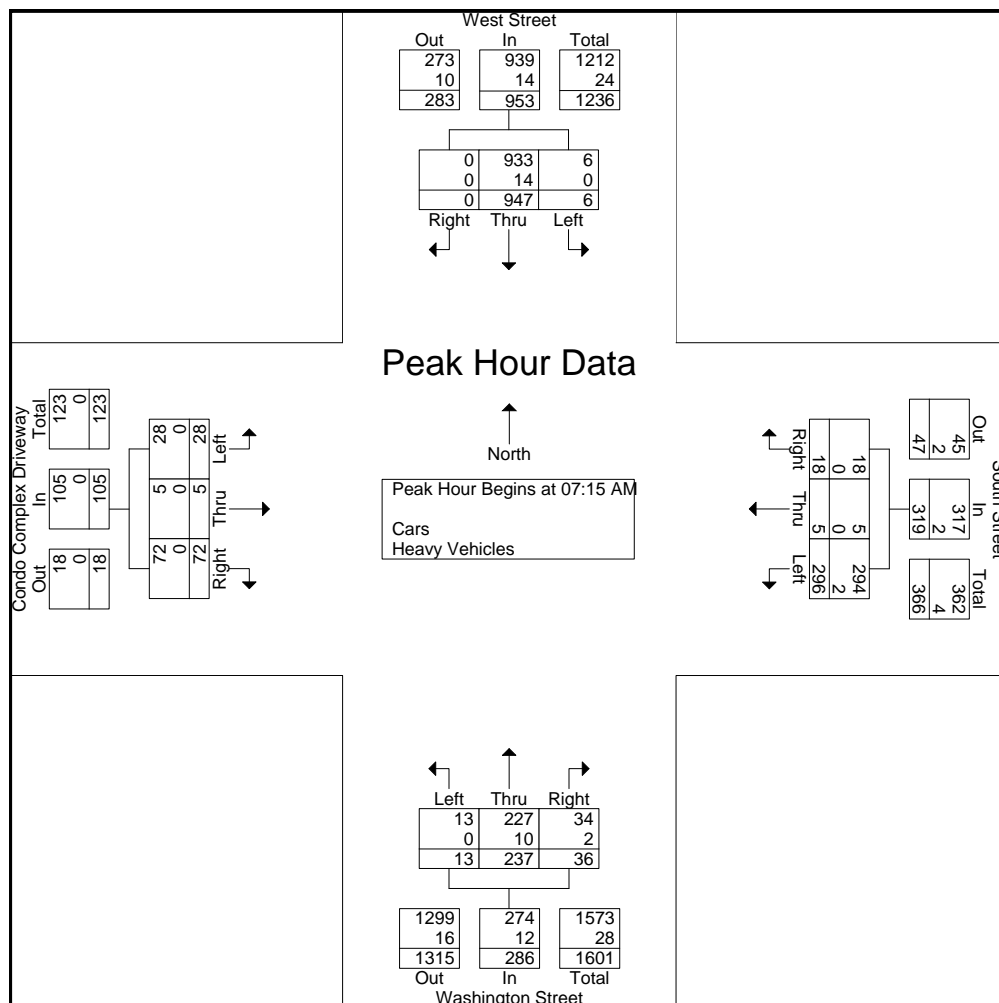
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	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	0	247	4	251	5	2	61	68	8	55	3	66	25	2	5	32	417
07:30 AM	0	238	1	239	2	1	65	68	5	46	5	56	13	1	8	22	385
07:45 AM	0	236	0	236	8	2	84	94	15	80	4	99	19	0	7	26	455
08:00 AM	0	226	1	227	3	0	86	89	8	56	1	65	15	2	8	25	406
Total Volume	0	947	6	953	18	5	296	319	36	237	13	286	72	5	28	105	1663
% App. Total	0	99.4	0.6		5.6	1.6	92.8		12.6	82.9	4.5		68.6	4.8	26.7		
PHF	.000	.959	.375	.949	.563	.625	.860	.848	.600	.741	.650	.722	.720	.625	.875	.820	.914
Cars	0	933	6	939	18	5	294	317	34	227	13	274	72	5	28	105	1635
% Cars	0	98.5	100	98.5	100	100	99.3	99.4	94.4	95.8	100	95.8	100	100	100	100	98.3
Heavy Vehicles	0	14	0	14	0	0	2	2	2	10	0	12	0	0	0	0	28
% Heavy Vehicles	0	1.5	0	1.5	0	0	0.7	0.6	5.6	4.2	0	4.2	0	0	0	0	1.7





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Client: DJK Associates/D. Kelly

File Name : 102371 CC
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	West Street From North			South Street From East			Washington Street From South			Condo Complex Driveway From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	1	81	2	2	0	9	50	187	7	5	0	3	347
04:15 PM	0	68	6	3	2	13	34	204	9	2	3	1	345
04:30 PM	2	77	3	8	1	12	51	232	4	4	1	2	397
04:45 PM	2	85	4	4	0	11	49	218	7	2	0	1	383
Total	5	311	15	17	3	45	184	841	27	13	4	7	1472
05:00 PM	0	91	3	4	0	18	60	252	9	3	0	1	441
05:15 PM	0	70	9	2	1	10	66	265	4	2	2	1	432
05:30 PM	0	74	6	4	2	11	40	243	11	8	1	6	406
05:45 PM	3	67	2	8	0	9	49	169	18	0	0	4	329
Total	3	302	20	18	3	48	215	929	42	13	3	12	1608
Grand Total	8	613	35	35	6	93	399	1770	69	26	7	19	3080
Apprch %	1.2	93.4	5.3	26.1	4.5	69.4	17.8	79.1	3.1	50	13.5	36.5	
Total %	0.3	19.9	1.1	1.1	0.2	3	13	57.5	2.2	0.8	0.2	0.6	
Cars	8	608	35	33	6	93	399	1764	69	26	6	19	3066
% Cars	100	99.2	100	94.3	100	100	100	99.7	100	100	85.7	100	99.5
Heavy Vehicles	0	5	0	2	0	0	0	6	0	0	1	0	14
% Heavy Vehicles	0	0.8	0	5.7	0	0	0	0.3	0	0	14.3	0	0.5

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	85	4	91	4	0	11	15	49	218	7	274	2	0	1	3	383
05:00 PM	0	91	3	94	4	0	18	22	60	252	9	321	3	0	1	4	441
05:15 PM	0	70	9	79	2	1	10	13	66	265	4	335	2	2	1	5	432
05:30 PM	0	74	6	80	4	2	11	17	40	243	11	294	8	1	6	15	406
Total Volume	2	320	22	344	14	3	50	67	215	978	31	1224	15	3	9	27	1662
% App. Total	0.6	93	6.4		20.9	4.5	74.6		17.6	79.9	2.5		55.6	11.1	33.3		
PHF	.250	.879	.611	.915	.875	.375	.694	.761	.814	.923	.705	.913	.469	.375	.375	.450	.942
Cars	2	317	22	341	14	3	50	67	215	975	31	1221	15	3	9	27	1656
% Cars	100	99.1	100	99.1	100	100	100	100	100	99.7	100	99.8	100	100	100	100	99.6
Heavy Vehicles	0	3	0	3	0	0	0	0	0	3	0	3	0	0	0	0	6
% Heavy Vehicles	0	0.9	0	0.9	0	0	0	0	0	0.3	0	0.2	0	0	0	0	0.4



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N/S: West Street/Washington Street
E/W: South Street/Condo Complex Driveway
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 CC
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

	West Street From North			South Street From East			Washington Street From South			Condo Complex Driveway From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	1	80	2	1	0	9	50	187	7	5	0	3	345
04:15 PM	0	68	6	3	2	13	34	204	9	2	2	1	344
04:30 PM	2	76	3	7	1	12	51	230	4	4	1	2	393
04:45 PM	2	84	4	4	0	11	49	216	7	2	0	1	380
Total	5	308	15	15	3	45	184	837	27	13	3	7	1462
05:00 PM	0	90	3	4	0	18	60	252	9	3	0	1	440
05:15 PM	0	69	9	2	1	10	66	264	4	2	2	1	430
05:30 PM	0	74	6	4	2	11	40	243	11	8	1	6	406
05:45 PM	3	67	2	8	0	9	49	168	18	0	0	4	328
Total	3	300	20	18	3	48	215	927	42	13	3	12	1604
Grand Total	8	608	35	33	6	93	399	1764	69	26	6	19	3066
Apprch %	1.2	93.4	5.4	25	4.5	70.5	17.9	79	3.1	51	11.8	37.3	
Total %	0.3	19.8	1.1	1.1	0.2	3	13	57.5	2.3	0.8	0.2	0.6	

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	84	4	90	4	0	11	15	49	216	7	272	2	0	1	3	380
05:00 PM	0	90	3	93	4	0	18	22	60	252	9	321	3	0	1	4	440
05:15 PM	0	69	9	78	2	1	10	13	66	264	4	334	2	2	1	5	430
05:30 PM	0	74	6	80	4	2	11	17	40	243	11	294	8	1	6	15	406
Total Volume	2	317	22	341	14	3	50	67	215	975	31	1221	15	3	9	27	1656
% App. Total	0.6	93	6.5		20.9	4.5	74.6		17.6	79.9	2.5		55.6	11.1	33.3		
PHF	.250	.881	.611	.917	.875	.375	.694	.761	.814	.923	.705	.914	.469	.375	.375	.450	.941



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Groups Printed- Heavy Vehicles

	West Street From North			South Street From East			Washington Street From South			Condo Complex Driveway From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
04:00 PM	0	1	0	1	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	1	0	1
04:30 PM	0	1	0	1	0	0	0	2	0	0	0	0	4
04:45 PM	0	1	0	0	0	0	0	2	0	0	0	0	3
Total	0	3	0	2	0	0	0	4	0	0	1	0	10
05:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	1
Total	0	2	0	0	0	0	0	2	0	0	0	0	4
Grand Total	0	5	0	2	0	0	0	6	0	0	1	0	14
Apprch %	0	100	0	100	0	0	0	100	0	0	100	0	
Total %	0	35.7	0	14.3	0	0	0	42.9	0	0	7.1	0	

	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
04:30 PM	0	1	0	1	1	0	0	1	0	2	0	2	0	0	0	0	4
04:45 PM	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	0	3
Total Volume	0	3	0	3	2	0	0	2	0	4	0	4	0	1	0	1	10
% App. Total	0	100	0		100	0	0		0	100	0		0	100	0		
PHF	.000	.750	.000	.750	.500	.000	.000	.500	.000	.500	.000	.500	.000	.250	.000	.250	.625



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Groups Printed- Peds and Bicycles

Start Time	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	3
Total	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	3
05:00 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	3
Grand Total	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	1	6
Apprch %	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	100	
Total %	0	0	0	0	0	0	0	66.7	0	0	0	16.7	0	0	0	16.7	

	West Street From North					South Street From East					Washington Street From South					Condo Complex Driveway From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	1	1	0	0	0	0	0	3
05:00 PM	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Total Volume	0	0	0	0	0	0	0	0	4	4	0	0	0	1	1	0	0	0	1	1	6
% App. Total	0	0	0	0	0	0	0	0	100		0	0	0	100		0	0	0	100		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.500	.500	.000	.000	.000	.250	.250	.000	.000	.000	.250	.250	.500



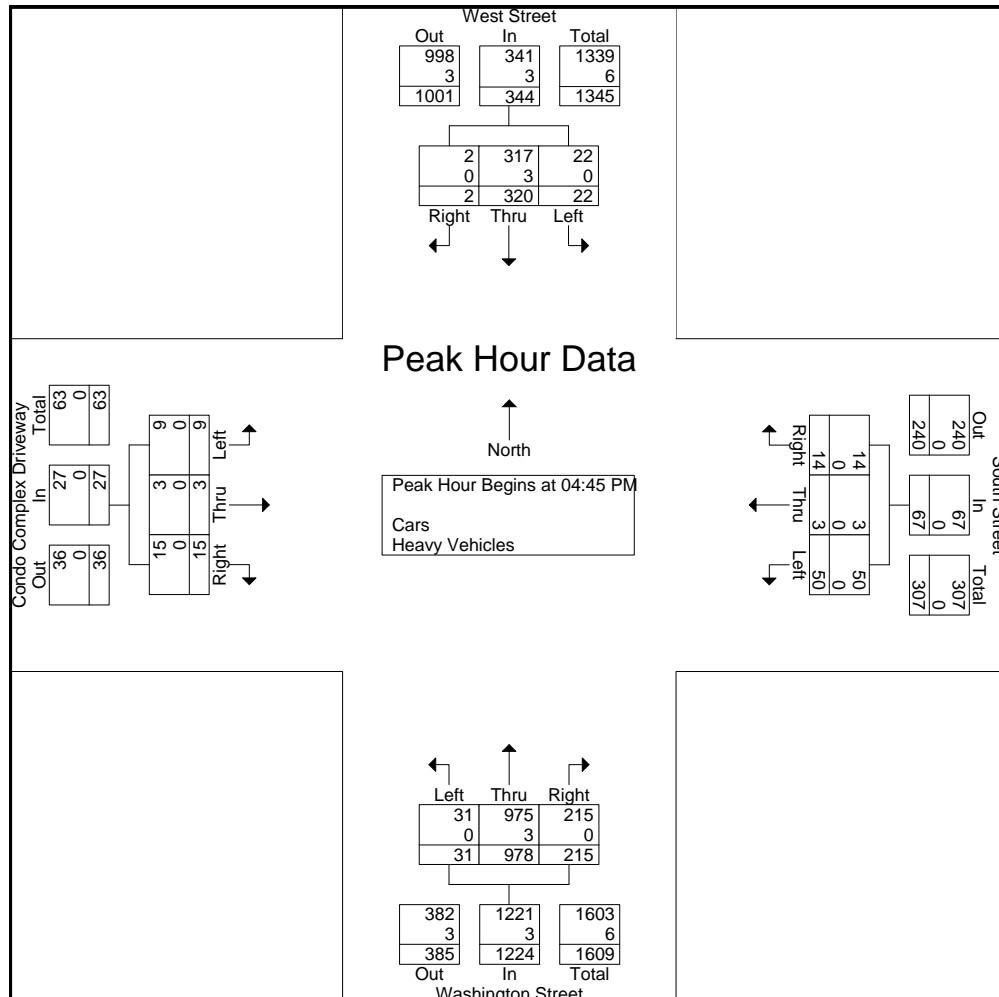
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	West Street From North				South Street From East				Washington Street From South				Condo Complex Driveway From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	2	85	4	91	4	0	11	15	49	218	7	274	2	0	1	3	383
05:00 PM	0	91	3	94	4	0	18	22	60	252	9	321	3	0	1	4	441
05:15 PM	0	70	9	79	2	1	10	13	66	265	4	335	2	2	1	5	432
05:30 PM	0	74	6	80	4	2	11	17	40	243	11	294	8	1	6	15	406
Total Volume	2	320	22	344	14	3	50	67	215	978	31	1224	15	3	9	27	1662
% App. Total	0.6	93	6.4		20.9	4.5	74.6		17.6	79.9	2.5		55.6	11.1	33.3		
PHF	.250	.879	.611	.915	.875	.375	.694	.761	.814	.923	.705	.913	.469	.375	.375	.450	.942
Cars	2	317	22	341	14	3	50	67	215	975	31	1221	15	3	9	27	1656
% Cars	100	99.1	100	99.1	100	100	100	100	100	99.7	100	99.8	100	100	100	100	99.6
Heavy Vehicles	0	3	0	3	0	0	0	0	0	3	0	3	0	0	0	0	6
% Heavy Vehicles	0	0.9	0	0.9	0	0	0	0	0	0.3	0	0.2	0	0	0	0	0.4





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N/S: Main Street (Route 28)
E/W: Hopkins Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 D
Site Code : 809
Start Date : 11/4/2010
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Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			Hopkins Street From East			Main Street (Route 28) From South			Hopkins Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	2	260	6	6	4	1	2	80	13	38	1	0	413
07:15 AM	2	309	9	12	5	5	3	80	21	44	3	0	493
07:30 AM	1	307	11	15	8	1	4	103	21	55	0	0	526
07:45 AM	1	322	9	15	15	1	1	100	26	65	3	0	558
Total	6	1198	35	48	32	8	10	363	81	202	7	0	1990
08:00 AM	2	276	11	16	6	0	1	139	35	56	2	0	544
08:15 AM	3	273	7	10	6	1	1	136	11	83	4	0	535
08:30 AM	4	242	4	7	0	1	0	115	12	38	1	0	424
08:45 AM	2	184	5	12	1	3	3	173	11	27	1	0	422
Total	11	975	27	45	13	5	5	563	69	204	8	0	1925
Grand Total	17	2173	62	93	45	13	15	926	150	406	15	0	3915
Apprch %	0.8	96.5	2.8	61.6	29.8	8.6	1.4	84.9	13.7	96.4	3.6	0	
Total %	0.4	55.5	1.6	2.4	1.1	0.3	0.4	23.7	3.8	10.4	0.4	0	
Cars	15	2141	61	89	45	13	15	892	143	406	15	0	3835
% Cars	88.2	98.5	98.4	95.7	100	100	100	96.3	95.3	100	100	0	98
Heavy Vehicles	2	32	1	4	0	0	0	34	7	0	0	0	80
% Heavy Vehicles	11.8	1.5	1.6	4.3	0	0	0	3.7	4.7	0	0	0	2

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	1	307	11	319	15	8	1	24	4	103	21	128	55	0	0	55	526
07:45 AM	1	322	9	332	15	15	1	31	1	100	26	127	65	3	0	68	558
08:00 AM	2	276	11	289	16	6	0	22	1	139	35	175	56	2	0	58	544
08:15 AM	3	273	7	283	10	6	1	17	1	136	11	148	83	4	0	87	535
Total Volume	7	1178	38	1223	56	35	3	94	7	478	93	578	259	9	0	268	2163
% App. Total	0.6	96.3	3.1		59.6	37.2	3.2		1.2	82.7	16.1		96.6	3.4	0		
PHF	.583	.915	.864	.921	.875	.583	.750	.758	.438	.860	.664	.826	.780	.563	.000	.770	.969
Cars	5	1160	38	1203	55	35	3	93	7	463	91	561	259	9	0	268	2125
% Cars	71.4	98.5	100	98.4	98.2	100	100	98.9	100	96.9	97.8	97.1	100	100	0	100	98.2
Heavy Vehicles	2	18	0	20	1	0	0	1	0	15	2	17	0	0	0	0	38
% Heavy Vehicles	28.6	1.5	0	1.6	1.8	0	0	1.1	0	3.1	2.2	2.9	0	0	0	0	1.8



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File Name : 102371 D
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Groups Printed- Cars

	Main Street (Route 28) From North			Hopkins Street From East			Main Street (Route 28) From South			Hopkins Street From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	2	257	6	6	4	1	2	74	12	38	1	0	403
07:15 AM	2	305	8	9	5	5	3	77	18	44	3	0	479
07:30 AM	1	301	11	15	8	1	4	101	21	55	0	0	518
07:45 AM	1	318	9	15	15	1	1	99	24	65	3	0	551
Total	6	1181	34	45	32	8	10	351	75	202	7	0	1951
08:00 AM	2	273	11	16	6	0	1	134	35	56	2	0	536
08:15 AM	1	268	7	9	6	1	1	129	11	83	4	0	520
08:30 AM	4	239	4	7	0	1	0	108	12	38	1	0	414
08:45 AM	2	180	5	12	1	3	3	170	10	27	1	0	414
Total	9	960	27	44	13	5	5	541	68	204	8	0	1884
Grand Total	15	2141	61	89	45	13	15	892	143	406	15	0	3835
Apprch %	0.7	96.6	2.8	60.5	30.6	8.8	1.4	85	13.6	96.4	3.6	0	
Total %	0.4	55.8	1.6	2.3	1.2	0.3	0.4	23.3	3.7	10.6	0.4	0	

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	1	301	11	313	15	8	1	24	4	101	21	126	55	0	0	55	518
07:45 AM	1	318	9	328	15	15	1	31	1	99	24	124	65	3	0	68	551
08:00 AM	2	273	11	286	16	6	0	22	1	134	35	170	56	2	0	58	536
08:15 AM	1	268	7	276	9	6	1	16	1	129	11	141	83	4	0	87	520
Total Volume	5	1160	38	1203	55	35	3	93	7	463	91	561	259	9	0	268	2125
% App. Total	0.4	96.4	3.2		59.1	37.6	3.2		1.2	82.5	16.2		96.6	3.4	0		
PHF	.625	.912	.864	.917	.859	.583	.750	.750	.438	.864	.650	.825	.780	.563	.000	.770	.964



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Client: DJK Associates/D. Kelly

File Name : 102371 D
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			Hopkins Street From East			Main Street (Route 28) From South			Hopkins Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
07:00 AM	0	3	0	0	0	0	0	6	1	0	0	0	10
07:15 AM	0	4	1	3	0	0	0	3	3	0	0	0	14
07:30 AM	0	6	0	0	0	0	0	2	0	0	0	0	8
07:45 AM	0	4	0	0	0	0	0	1	2	0	0	0	7
Total	0	17	1	3	0	0	0	12	6	0	0	0	39
08:00 AM	0	3	0	0	0	0	0	5	0	0	0	0	8
08:15 AM	2	5	0	1	0	0	0	7	0	0	0	0	15
08:30 AM	0	3	0	0	0	0	0	7	0	0	0	0	10
08:45 AM	0	4	0	0	0	0	0	3	1	0	0	0	8
Total	2	15	0	1	0	0	0	22	1	0	0	0	41
Grand Total	2	32	1	4	0	0	0	34	7	0	0	0	80
Apprch %	5.7	91.4	2.9	100	0	0	0	82.9	17.1	0	0	0	
Total %	2.5	40	1.2	5	0	0	0	42.5	8.8	0	0	0	

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	0	3	0	3	0	0	0	0	0	5	0	5	0	0	0	0	8
08:15 AM	2	5	0	7	1	0	0	1	0	7	0	7	0	0	0	0	15
08:30 AM	0	3	0	3	0	0	0	0	0	7	0	7	0	0	0	0	10
08:45 AM	0	4	0	4	0	0	0	0	0	3	1	4	0	0	0	0	8
Total Volume	2	15	0	17	1	0	0	1	0	22	1	23	0	0	0	0	41
% App. Total	11.8	88.2	0		100	0	0		0	95.7	4.3		0	0	0		
PHF	.250	.750	.000	.607	.250	.000	.000	.250	.000	.786	.250	.821	.000	.000	.000	.000	.683



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N/S: Main Street (Route 28)
E/W: Hopkins Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 D
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Peds and Bicycles

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
07:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	3
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Grand Total	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	4
Apprch %	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	
Total %	0	0	0	50	0	0	0	50	0	0	0	0	0	0	0	0	

	Main Street (Route 28) From North					Hopkins Street From East					Main Street (Route 28) From South					Hopkins Street From West					Int. Total
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	2	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3
% App. Total	0	0	0	100		0	0	0	100		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.250	.250	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.375



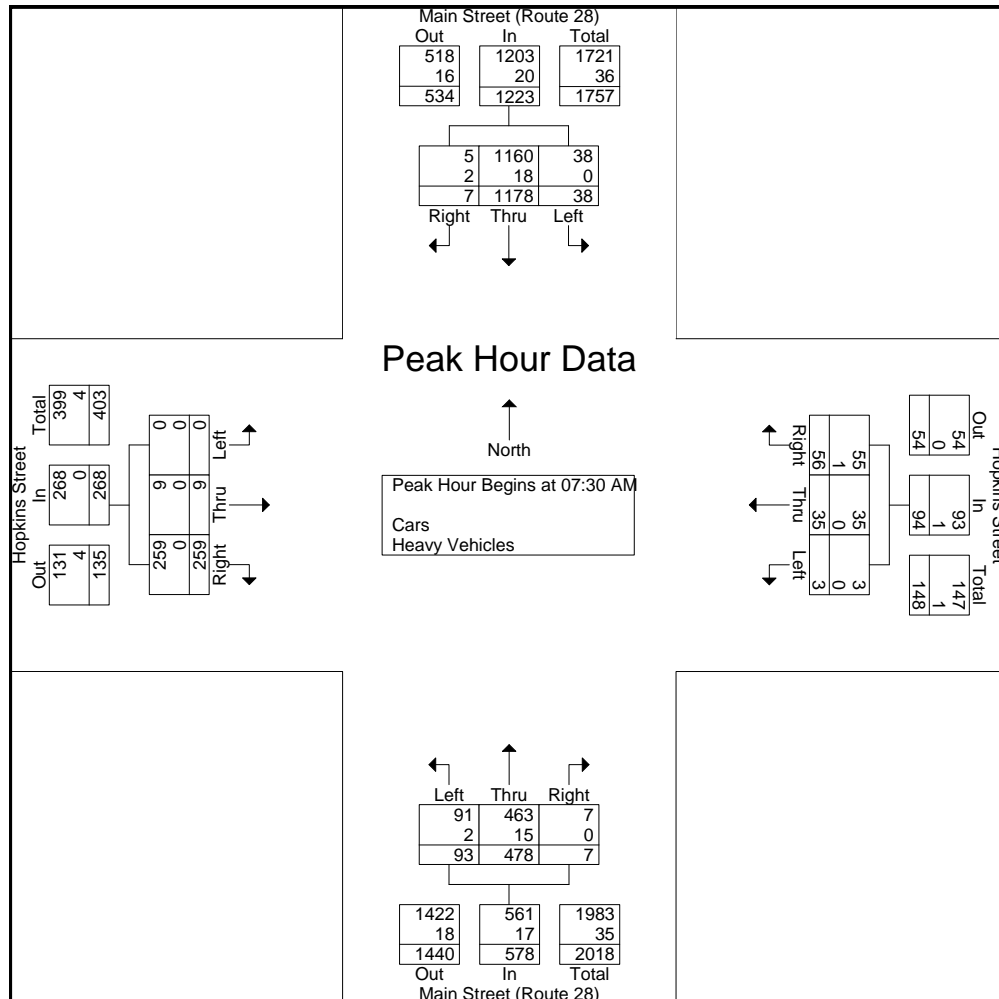
PRECISION
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N/S: Main Street (Route 28)
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File Name : 102371 D
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Page No : 1

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	1	307	11	319	15	8	1	24	4	103	21	128	55	0	0	55	526
07:45 AM	1	322	9	332	15	15	1	31	1	100	26	127	65	3	0	68	558
08:00 AM	2	276	11	289	16	6	0	22	1	139	35	175	56	2	0	58	544
08:15 AM	3	273	7	283	10	6	1	17	1	136	11	148	83	4	0	87	535
Total Volume	7	1178	38	1223	56	35	3	94	7	478	93	578	259	9	0	268	2163
% App. Total	0.6	96.3	3.1		59.6	37.2	3.2		1.2	82.7	16.1		96.6	3.4	0		
PHF	.583	.915	.864	.921	.875	.583	.750	.758	.438	.860	.664	.826	.780	.563	.000	.770	.969
Cars	5	1160	38	1203	55	35	3	93	7	463	91	561	259	9	0	268	2125
% Cars	71.4	98.5	100	98.4	98.2	100	100	98.9	100	96.9	97.8	97.1	100	100	0	100	98.2
Heavy Vehicles	2	18	0	20	1	0	0	1	0	15	2	17	0	0	0	0	38
% Heavy Vehicles	28.6	1.5	0	1.6	1.8	0	0	1.1	0	3.1	2.2	2.9	0	0	0	0	1.8





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File Name : 102371 DD
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Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			Hopkins Street From East			Main Street (Route 28) From South			Hopkins Street From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	7	137	10	9	4	1	7	171	26	23	0	0	395
04:15 PM	6	142	14	16	0	2	8	193	23	9	1	0	414
04:30 PM	7	148	9	12	2	3	7	190	25	23	0	0	426
04:45 PM	9	131	14	18	0	1	6	189	27	17	1	0	413
Total	29	558	47	55	6	7	28	743	101	72	2	0	1648
05:00 PM	12	171	17	17	0	1	5	211	24	19	0	0	477
05:15 PM	7	149	16	13	2	0	9	197	31	19	3	0	446
05:30 PM	10	144	18	26	5	1	6	215	29	21	0	0	475
05:45 PM	5	147	17	18	3	2	9	212	44	21	1	1	480
Total	34	611	68	74	10	4	29	835	128	80	4	1	1878
Grand Total	63	1169	115	129	16	11	57	1578	229	152	6	1	3526
Apprch %	4.7	86.8	8.5	82.7	10.3	7.1	3.1	84.7	12.3	95.6	3.8	0.6	
Total %	1.8	33.2	3.3	3.7	0.5	0.3	1.6	44.8	6.5	4.3	0.2	0	
Cars	62	1157	115	129	16	11	57	1570	228	151	6	1	3503
% Cars	98.4	99	100	100	100	100	100	99.5	99.6	99.3	100	100	99.3
Heavy Vehicles	1	12	0	0	0	0	0	8	1	1	0	0	23
% Heavy Vehicles	1.6	1	0	0	0	0	0	0.5	0.4	0.7	0	0	0.7

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	12	171	17	200	17	0	1	18	5	211	24	240	19	0	0	19	477
05:15 PM	7	149	16	172	13	2	0	15	9	197	31	237	19	3	0	22	446
05:30 PM	10	144	18	172	26	5	1	32	6	215	29	250	21	0	0	21	475
05:45 PM	5	147	17	169	18	3	2	23	9	212	44	265	21	1	1	23	480
Total Volume	34	611	68	713	74	10	4	88	29	835	128	992	80	4	1	85	1878
% App. Total	4.8	85.7	9.5		84.1	11.4	4.5		2.9	84.2	12.9		94.1	4.7	1.2		
PHF	.708	.893	.944	.891	.712	.500	.500	.688	.806	.971	.727	.936	.952	.333	.250	.924	.978
Cars	34	605	68	707	74	10	4	88	29	833	128	990	79	4	1	84	1869
% Cars	100	99.0	100	99.2	100	100	100	100	100	99.8	100	99.8	98.8	100	100	98.8	99.5
Heavy Vehicles	0	6	0	6	0	0	0	0	0	2	0	2	1	0	0	1	9
% Heavy Vehicles	0	1.0	0	0.8	0	0	0	0	0	0.2	0	0.2	1.3	0	0	1.2	0.5



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N/S: Main Street (Route 28)
E/W: Hopkins Street
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 DD
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

	Main Street (Route 28) From North			Hopkins Street From East			Main Street (Route 28) From South			Hopkins Street From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	6	135	10	9	4	1	7	168	26	23	0	0	389
04:15 PM	6	142	14	16	0	2	8	191	23	9	1	0	412
04:30 PM	7	146	9	12	2	3	7	190	25	23	0	0	424
04:45 PM	9	129	14	18	0	1	6	188	26	17	1	0	409
Total	28	552	47	55	6	7	28	737	100	72	2	0	1634
05:00 PM	12	169	17	17	0	1	5	211	24	19	0	0	475
05:15 PM	7	149	16	13	2	0	9	197	31	19	3	0	446
05:30 PM	10	142	18	26	5	1	6	214	29	20	0	0	471
05:45 PM	5	145	17	18	3	2	9	211	44	21	1	1	477
Total	34	605	68	74	10	4	29	833	128	79	4	1	1869
Grand Total	62	1157	115	129	16	11	57	1570	228	151	6	1	3503
Apprch %	4.6	86.7	8.6	82.7	10.3	7.1	3.1	84.6	12.3	95.6	3.8	0.6	
Total %	1.8	33	3.3	3.7	0.5	0.3	1.6	44.8	6.5	4.3	0.2	0	

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	12	169	17	198	17	0	1	18	5	211	24	240	19	0	0	19	475
05:15 PM	7	149	16	172	13	2	0	15	9	197	31	237	19	3	0	22	446
05:30 PM	10	142	18	170	26	5	1	32	6	214	29	249	20	0	0	20	471
05:45 PM	5	145	17	167	18	3	2	23	9	211	44	264	21	1	1	23	477
Total Volume	34	605	68	707	74	10	4	88	29	833	128	990	79	4	1	84	1869
% App. Total	4.8	85.6	9.6		84.1	11.4	4.5		2.9	84.1	12.9		94	4.8	1.2		
PHF	.708	.895	.944	.893	.712	.500	.500	.688	.806	.973	.727	.938	.940	.333	.250	.913	.980



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Page No : 1

Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			Hopkins Street From East			Main Street (Route 28) From South			Hopkins Street From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
04:00 PM	1	2	0	0	0	0	0	3	0	0	0	0	6
04:15 PM	0	0	0	0	0	0	0	2	0	0	0	0	2
04:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	0	2	0	0	0	0	0	1	1	0	0	0	4
Total	1	6	0	0	0	0	0	6	1	0	0	0	14
05:00 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	2	0	0	0	0	0	1	0	1	0	0	4
05:45 PM	0	2	0	0	0	0	0	1	0	0	0	0	3
Total	0	6	0	0	0	0	0	2	0	1	0	0	9
Grand Total	1	12	0	0	0	0	0	8	1	1	0	0	23
Apprch %	7.7	92.3	0	0	0	0	0	88.9	11.1	100	0	0	
Total %	4.3	52.2	0	0	0	0	0	34.8	4.3	4.3	0	0	

	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	1	2	0	3	0	0	0	0	0	3	0	3	0	0	0	0	6
04:15 PM	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	2
04:30 PM	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:45 PM	0	2	0	2	0	0	0	0	0	1	1	2	0	0	0	0	4
Total Volume	1	6	0	7	0	0	0	0	0	6	1	7	0	0	0	0	14
% App. Total	14.3	85.7	0		0	0	0		0	85.7	14.3		0	0	0		
PHF	.250	.750	.000	.583	.000	.000	.000	.000	.000	.500	.250	.583	.000	.000	.000	.000	.583



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Groups Printed- Peds and Bicycles

Start Time	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total %																	

	Main Street (Route 28) From North					Hopkins Street From East					Main Street (Route 28) From South					Hopkins Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000



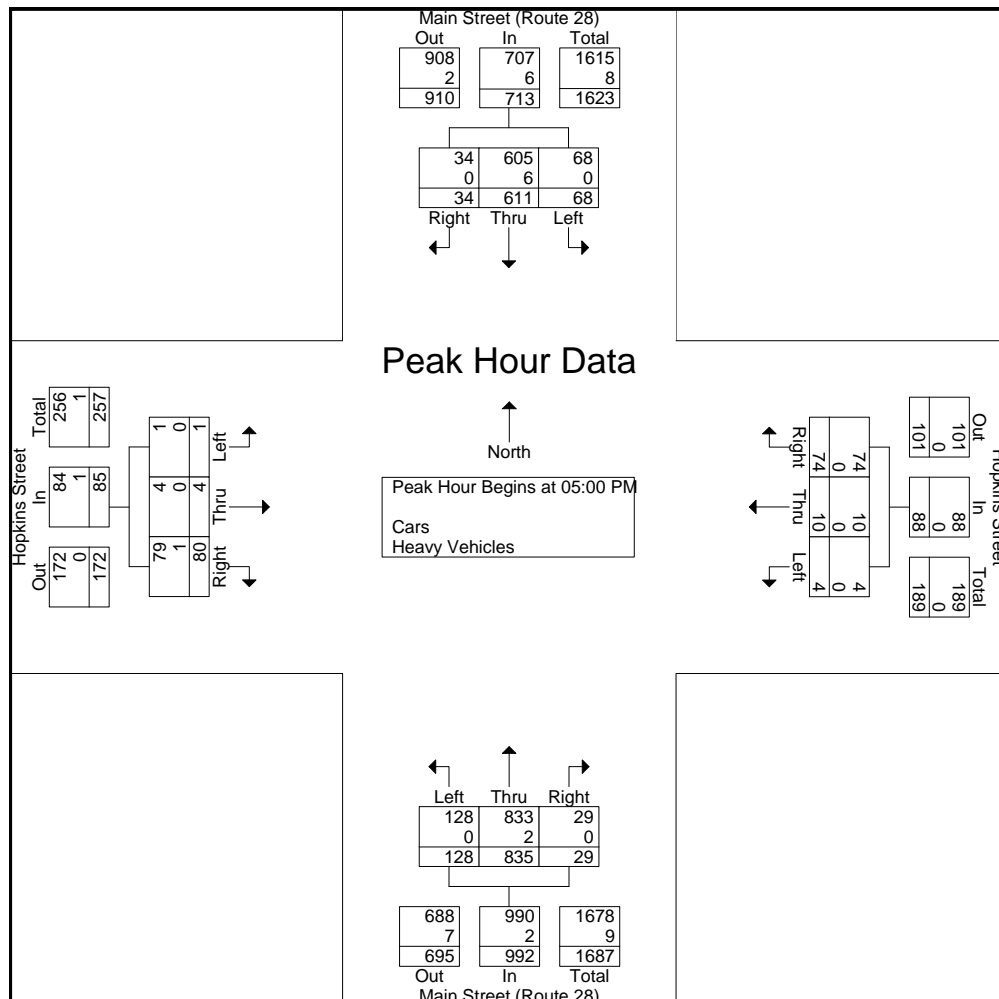
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	Main Street (Route 28) From North				Hopkins Street From East				Main Street (Route 28) From South				Hopkins Street From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	12	171	17	200	17	0	1	18	5	211	24	240	19	0	0	19	477
05:15 PM	7	149	16	172	13	2	0	15	9	197	31	237	19	3	0	22	446
05:30 PM	10	144	18	172	26	5	1	32	6	215	29	250	21	0	0	21	475
05:45 PM	5	147	17	169	18	3	2	23	9	212	44	265	21	1	1	23	480
Total Volume	34	611	68	713	74	10	4	88	29	835	128	992	80	4	1	85	1878
% App. Total	4.8	85.7	9.5		84.1	11.4	4.5		2.9	84.2	12.9		94.1	4.7	1.2		
PHF	.708	.893	.944	.891	.712	.500	.500	.688	.806	.971	.727	.936	.952	.333	.250	.924	.978
Cars	34	605	68	707	74	10	4	88	29	833	128	990	79	4	1	84	1869
% Cars	100	99.0	100	99.2	100	100	100	100	100	99.8	100	99.8	98.8	100	100	98.8	99.5
Heavy Vehicles	0	6	0	6	0	0	0	0	0	2	0	2	1	0	0	1	9
% Heavy Vehicles	0	1.0	0	0.8	0	0	0	0	0	0.2	0	0.2	1.3	0	0	1.2	0.5





PRECISION
D A T A
INDUSTRIES, LLC

P.O. Box 301 Berlin, MA 01503
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N/S: Main Street (Route 28)
E/W: Summer Avenue
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 E
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles

	Main Street (Route 28) From North			Summer Avenue From East			Main Street (Route 28) From South			Summer Avenue From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	3	239	3	4	6	16	1	76	6	5	0	11	370
07:15 AM	7	276	1	3	6	13	2	79	3	9	3	10	412
07:30 AM	16	262	3	5	9	13	4	90	11	22	6	14	455
07:45 AM	20	279	3	8	14	14	3	92	11	15	1	19	479
Total	46	1056	10	20	35	56	10	337	31	51	10	54	1716
08:00 AM	9	227	0	2	18	11	4	103	10	17	8	18	427
08:15 AM	15	204	3	3	10	12	2	117	9	31	1	13	420
08:30 AM	6	210	1	6	4	6	3	108	9	20	2	5	380
08:45 AM	6	181	1	2	4	13	1	168	4	7	2	13	402
Total	36	822	5	13	36	42	10	496	32	75	13	49	1629
Grand Total	82	1878	15	33	71	98	20	833	63	126	23	103	3345
Apprch %	4.2	95.1	0.8	16.3	35.1	48.5	2.2	90.9	6.9	50	9.1	40.9	
Total %	2.5	56.1	0.4	1	2.1	2.9	0.6	24.9	1.9	3.8	0.7	3.1	
Cars	80	1838	15	32	70	98	20	801	60	124	23	101	3262
% Cars	97.6	97.9	100	97	98.6	100	100	96.2	95.2	98.4	100	98.1	97.5
Heavy Vehicles	2	40	0	1	1	0	0	32	3	2	0	2	83
% Heavy Vehicles	2.4	2.1	0	3	1.4	0	0	3.8	4.8	1.6	0	1.9	2.5

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	16	262	3	281	5	9	13	27	4	90	11	105	22	6	14	42	455
07:45 AM	20	279	3	302	8	14	14	36	3	92	11	106	15	1	19	35	479
08:00 AM	9	227	0	236	2	18	11	31	4	103	10	117	17	8	18	43	427
08:15 AM	15	204	3	222	3	10	12	25	2	117	9	128	31	1	13	45	420
Total Volume	60	972	9	1041	18	51	50	119	13	402	41	456	85	16	64	165	1781
% App. Total	5.8	93.4	0.9		15.1	42.9	42		2.9	88.2	9		51.5	9.7	38.8		
PHF	.750	.871	.750	.862	.563	.708	.893	.826	.813	.859	.932	.891	.685	.500	.842	.917	.930
Cars	58	947	9	1014	17	50	50	117	13	386	40	439	84	16	62	162	1732
% Cars	96.7	97.4	100	97.4	94.4	98.0	100	98.3	100	96.0	97.6	96.3	98.8	100	96.9	98.2	97.2
Heavy Vehicles	2	25	0	27	1	1	0	2	0	16	1	17	1	0	2	3	49
% Heavy Vehicles	3.3	2.6	0	2.6	5.6	2.0	0	1.7	0	4.0	2.4	3.7	1.2	0	3.1	1.8	2.8



PRECISION
D A T A
INDUSTRIES, LLC

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N/S: Main Street (Route 28)
E/W: Summer Avenue
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 E
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars

	Main Street (Route 28) From North			Summer Avenue From East			Main Street (Route 28) From South			Summer Avenue From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	3	235	3	4	6	16	1	70	6	5	0	11	360
07:15 AM	7	271	1	3	6	13	2	77	1	9	3	10	403
07:30 AM	16	255	3	5	9	13	4	88	11	22	6	12	444
07:45 AM	19	272	3	7	13	14	3	89	11	15	1	19	466
Total	45	1033	10	19	34	56	10	324	29	51	10	52	1673
08:00 AM	8	223	0	2	18	11	4	98	10	17	8	18	417
08:15 AM	15	197	3	3	10	12	2	111	8	30	1	13	405
08:30 AM	6	207	1	6	4	6	3	103	9	19	2	5	371
08:45 AM	6	178	1	2	4	13	1	165	4	7	2	13	396
Total	35	805	5	13	36	42	10	477	31	73	13	49	1589
Grand Total	80	1838	15	32	70	98	20	801	60	124	23	101	3262
Apprch %	4.1	95.1	0.8	16	35	49	2.3	90.9	6.8	50	9.3	40.7	
Total %	2.5	56.3	0.5	1	2.1	3	0.6	24.6	1.8	3.8	0.7	3.1	

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	16	255	3	274	5	9	13	27	4	88	11	103	22	6	12	40	444
07:45 AM	19	272	3	294	7	13	14	34	3	89	11	103	15	1	19	35	466
08:00 AM	8	223	0	231	2	18	11	31	4	98	10	112	17	8	18	43	417
08:15 AM	15	197	3	215	3	10	12	25	2	111	8	121	30	1	13	44	405
Total Volume	58	947	9	1014	17	50	50	117	13	386	40	439	84	16	62	162	1732
% App. Total	5.7	93.4	0.9		14.5	42.7	42.7		3	87.9	9.1		51.9	9.9	38.3		
PHF	.763	.870	.750	.862	.607	.694	.893	.860	.813	.869	.909	.907	.700	.500	.816	.920	.929



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File Name : 102371 E
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			Summer Avenue From East			Main Street (Route 28) From South			Summer Avenue From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	0	4	0	0	0	0	0	6	0	0	0	0	10
07:15 AM	0	5	0	0	0	0	0	2	2	0	0	0	9
07:30 AM	0	7	0	0	0	0	0	2	0	0	0	2	11
07:45 AM	1	7	0	1	1	0	0	3	0	0	0	0	13
Total	1	23	0	1	1	0	0	13	2	0	0	2	43
08:00 AM	1	4	0	0	0	0	0	5	0	0	0	0	10
08:15 AM	0	7	0	0	0	0	0	6	1	1	0	0	15
08:30 AM	0	3	0	0	0	0	0	5	0	1	0	0	9
08:45 AM	0	3	0	0	0	0	0	3	0	0	0	0	6
Total	1	17	0	0	0	0	0	19	1	2	0	0	40
Grand Total	2	40	0	1	1	0	0	32	3	2	0	2	83
Apprch %	4.8	95.2	0	50	50	0	0	91.4	8.6	50	0	50	
Total %	2.4	48.2	0	1.2	1.2	0	0	38.6	3.6	2.4	0	2.4	

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	7	0	7	0	0	0	0	0	2	0	2	0	0	2	2	11
07:45 AM	1	7	0	8	1	1	0	2	0	3	0	3	0	0	0	0	13
08:00 AM	1	4	0	5	0	0	0	0	0	5	0	5	0	0	0	0	10
08:15 AM	0	7	0	7	0	0	0	0	0	6	1	7	1	0	0	1	15
Total Volume	2	25	0	27	1	1	0	2	0	16	1	17	1	0	2	3	49
% App. Total	7.4	92.6	0		50	50	0		0	94.1	5.9		33.3	0	66.7		
PHF	.500	.893	.000	.844	.250	.250	.000	.250	.000	.667	.250	.607	.250	.000	.250	.375	.817



PRECISION
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N/S: Main Street (Route 28)
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Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Peds and Bicycles

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	0	4
08:00 AM	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
Grand Total	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0	0	6
Apprch %	0	0	0	100	0	0	0	100	0	0	0	0	0	0	0	0	
Total %	0	0	0	66.7	0	0	0	33.3	0	0	0	0	0	0	0	0	

	Main Street (Route 28) From North					Summer Avenue From East					Main Street (Route 28) From South					Summer Avenue From West					Int. Total
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:15 AM																					
07:15 AM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
08:00 AM	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	4	4	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	5
% App. Total	0	0	0	100		0	0	0	100		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.333	.333	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.417



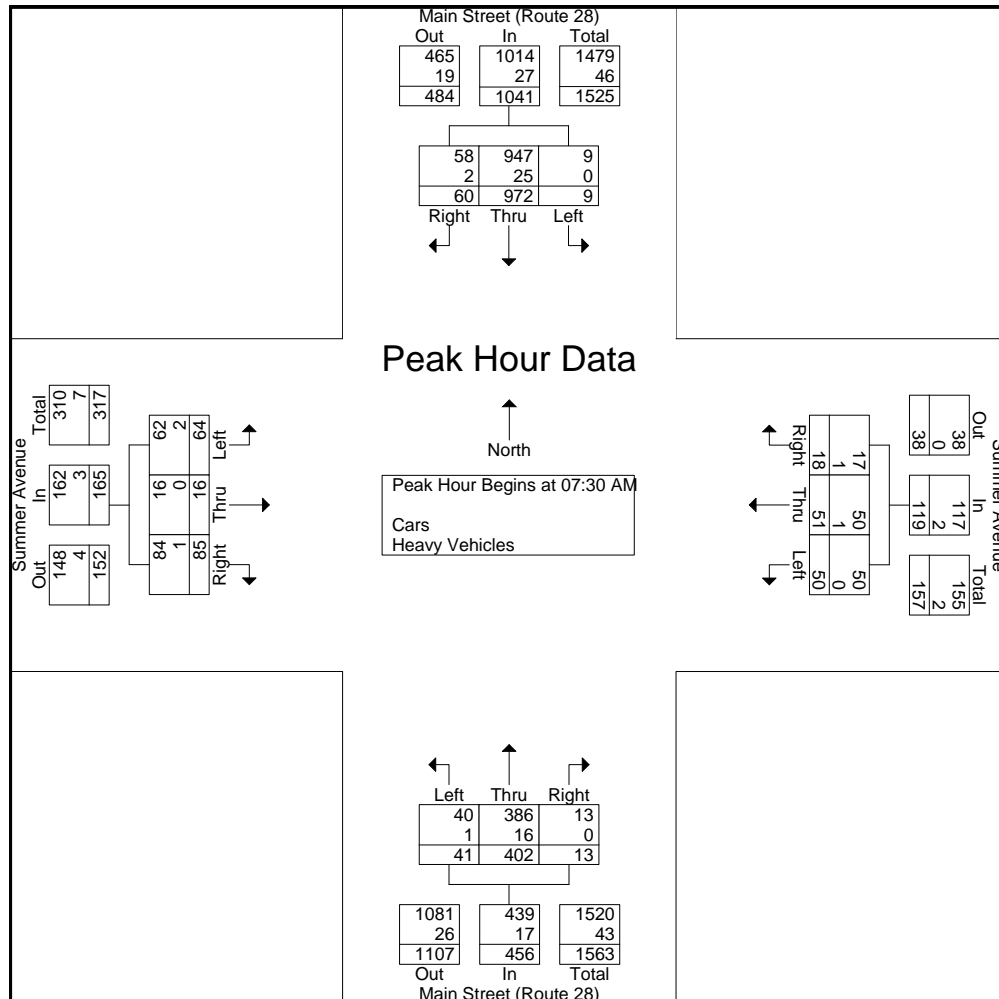
PRECISION
D A T A
INDUSTRIES, LLC

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	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	16	262	3	281	5	9	13	27	4	90	11	105	22	6	14	42	455
07:45 AM	20	279	3	302	8	14	14	36	3	92	11	106	15	1	19	35	479
08:00 AM	9	227	0	236	2	18	11	31	4	103	10	117	17	8	18	43	427
08:15 AM	15	204	3	222	3	10	12	25	2	117	9	128	31	1	13	45	420
Total Volume	60	972	9	1041	18	51	50	119	13	402	41	456	85	16	64	165	1781
% App. Total	5.8	93.4	0.9		15.1	42.9	42		2.9	88.2	9		51.5	9.7	38.8		
PHF	.750	.871	.750	.862	.563	.708	.893	.826	.813	.859	.932	.891	.685	.500	.842	.917	.930
Cars	58	947	9	1014	17	50	50	117	13	386	40	439	84	16	62	162	1732
% Cars	96.7	97.4	100	97.4	94.4	98.0	100	98.3	100	96.0	97.6	96.3	98.8	100	96.9	98.2	97.2
Heavy Vehicles	2	25	0	27	1	1	0	2	0	16	1	17	1	0	2	3	49
% Heavy Vehicles	3.3	2.6	0	2.6	5.6	2.0	0	1.7	0	4.0	2.4	3.7	1.2	0	3.1	1.8	2.8





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File Name : 102371 EE
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Cars - Heavy Vehicles													
Start Time	Main Street (Route 28) From North			Summer Avenue From East			Main Street (Route 28) From South			Summer Avenue From West			Int. Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	6	114	4	4	7	5	4	144	6	19	6	15	334
04:15 PM	11	126	4	3	3	7	5	168	10	10	5	12	364
04:30 PM	5	120	0	0	0	5	4	176	8	10	5	13	346
04:45 PM	11	117	3	5	10	6	3	145	8	16	7	25	356
Total	33	477	11	12	20	23	16	633	32	55	23	65	1400
05:00 PM	11	162	1	2	2	2	6	179	13	8	8	19	413
05:15 PM	11	132	3	4	4	10	5	181	2	21	6	13	392
05:30 PM	13	127	4	1	2	5	8	202	13	14	3	21	413
05:45 PM	11	147	4	2	4	8	5	186	6	12	5	18	408
Total	46	568	12	9	12	25	24	748	34	55	22	71	1626
Grand Total	79	1045	23	21	32	48	40	1381	66	110	45	136	3026
Apprch %	6.9	91.1	2	20.8	31.7	47.5	2.7	92.9	4.4	37.8	15.5	46.7	
Total %	2.6	34.5	0.8	0.7	1.1	1.6	1.3	45.6	2.2	3.6	1.5	4.5	
Cars	79	1033	23	21	32	47	40	1376	65	109	44	134	3003
% Cars	100	98.9	100	100	100	97.9	100	99.6	98.5	99.1	97.8	98.5	99.2
Heavy Vehicles	0	12	0	0	0	1	0	5	1	1	1	2	23
% Heavy Vehicles	0	1.1	0	0	0	2.1	0	0.4	1.5	0.9	2.2	1.5	0.8

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	11	162	1	174	2	2	2	6	6	179	13	198	8	8	19	35	413
05:15 PM	11	132	3	146	4	4	10	18	5	181	2	188	21	6	13	40	392
05:30 PM	13	127	4	144	1	2	5	8	8	202	13	223	14	3	21	38	413
05:45 PM	11	147	4	162	2	4	8	14	5	186	6	197	12	5	18	35	408
Total Volume	46	568	12	626	9	12	25	46	24	748	34	806	55	22	71	148	1626
% App. Total	7.3	90.7	1.9		19.6	26.1	54.3		3	92.8	4.2		37.2	14.9	48		
PHF	.885	.877	.750	.899	.563	.750	.625	.639	.750	.926	.654	.904	.655	.688	.845	.925	.984
Cars	46	563	12	621	9	12	24	45	24	748	34	806	55	21	70	146	1618
% Cars	100	99.1	100	99.2	100	100	96.0	97.8	100	100	100	100	100	95.5	98.6	98.6	99.5
Heavy Vehicles	0	5	0	5	0	0	1	1	0	0	0	0	0	1	1	2	8
% Heavy Vehicles	0	0.9	0	0.8	0	0	4.0	2.2	0	0	0	0	0	4.5	1.4	1.4	0.5



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Groups Printed- Cars

	Main Street (Route 28) From North			Summer Avenue From East			Main Street (Route 28) From South			Summer Avenue From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	6	112	4	4	7	5	4	140	6	19	6	15	328
04:15 PM	11	126	4	3	3	7	5	167	9	10	5	11	361
04:30 PM	5	118	0	0	0	5	4	176	8	9	5	13	343
04:45 PM	11	114	3	5	10	6	3	145	8	16	7	25	353
Total	33	470	11	12	20	23	16	628	31	54	23	64	1385
05:00 PM	11	162	1	2	2	1	6	179	13	8	7	18	410
05:15 PM	11	132	3	4	4	10	5	181	2	21	6	13	392
05:30 PM	13	125	4	1	2	5	8	202	13	14	3	21	411
05:45 PM	11	144	4	2	4	8	5	186	6	12	5	18	405
Total	46	563	12	9	12	24	24	748	34	55	21	70	1618
Grand Total	79	1033	23	21	32	47	40	1376	65	109	44	134	3003
Apprch %	7	91	2	21	32	47	2.7	92.9	4.4	38	15.3	46.7	
Total %	2.6	34.4	0.8	0.7	1.1	1.6	1.3	45.8	2.2	3.6	1.5	4.5	

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	11	162	1	174	2	2	1	5	6	179	13	198	8	7	18	33	410
05:15 PM	11	132	3	146	4	4	10	18	5	181	2	188	21	6	13	40	392
05:30 PM	13	125	4	142	1	2	5	8	8	202	13	223	14	3	21	38	411
05:45 PM	11	144	4	159	2	4	8	14	5	186	6	197	12	5	18	35	405
Total Volume	46	563	12	621	9	12	24	45	24	748	34	806	55	21	70	146	1618
% App. Total	7.4	90.7	1.9		20	26.7	53.3		3	92.8	4.2		37.7	14.4	47.9		
PHF	.885	.869	.750	.892	.563	.750	.600	.625	.750	.926	.654	.904	.655	.750	.833	.913	.984



PRECISION
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N/S: Main Street (Route 28)
E/W: Summer Avenue
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 EE
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Heavy Vehicles

	Main Street (Route 28) From North			Summer Avenue From East			Main Street (Route 28) From South			Summer Avenue From West			Int. Total
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
04:00 PM	0	2	0	0	0	0	0	4	0	0	0	0	6
04:15 PM	0	0	0	0	0	0	0	1	1	0	0	1	3
04:30 PM	0	2	0	0	0	0	0	0	0	1	0	0	3
04:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	7	0	0	0	0	0	5	1	1	0	1	15
05:00 PM	0	0	0	0	0	1	0	0	0	0	1	1	3
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	2	0	0	0	0	0	0	0	0	0	0	2
05:45 PM	0	3	0	0	0	0	0	0	0	0	0	0	3
Total	0	5	0	0	0	1	0	0	0	0	1	1	8
Grand Total	0	12	0	0	0	1	0	5	1	1	1	2	23
Apprch %	0	100	0	0	0	100	0	83.3	16.7	25	25	50	
Total %	0	52.2	0	0	0	4.3	0	21.7	4.3	4.3	4.3	8.7	

	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	2	0	2	0	0	0	0	0	4	0	4	0	0	0	0	6
04:15 PM	0	0	0	0	0	0	0	0	0	1	1	2	0	0	1	1	3
04:30 PM	0	2	0	2	0	0	0	0	0	0	0	0	1	0	0	1	3
04:45 PM	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total Volume	0	7	0	7	0	0	0	0	0	5	1	6	1	0	1	2	15
% App. Total	0	100	0		0	0	0		0	83.3	16.7		50	0	50		
PHF	.000	.583	.000	.583	.000	.000	.000	.000	.000	.313	.250	.375	.250	.000	.250	.500	.625



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N/S: Main Street (Route 28)
E/W: Summer Avenue
City, State: Reading, MA
Client: DJK Associates/D. Kelly

File Name : 102371 EE
Site Code : 809
Start Date : 11/4/2010
Page No : 1

Groups Printed- Peds and Bicycles

Start Time	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Grand Total	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	3
Apprch %	0	0	0	0	0	0	0	100	0	0	0	100	0	0	0	100	
Total %	0	0	0	0	0	0	0	33.3	0	0	0	33.3	0	0	0	33.3	

	Main Street (Route 28) From North					Summer Avenue From East					Main Street (Route 28) From South					Summer Avenue From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	2
% App. Total	0	0	0	0	0	0	0	0	100		0	0	0	100		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.250	.250	.000	.000	.000	.250	.250	.000	.000	.000	.000	.000	.500



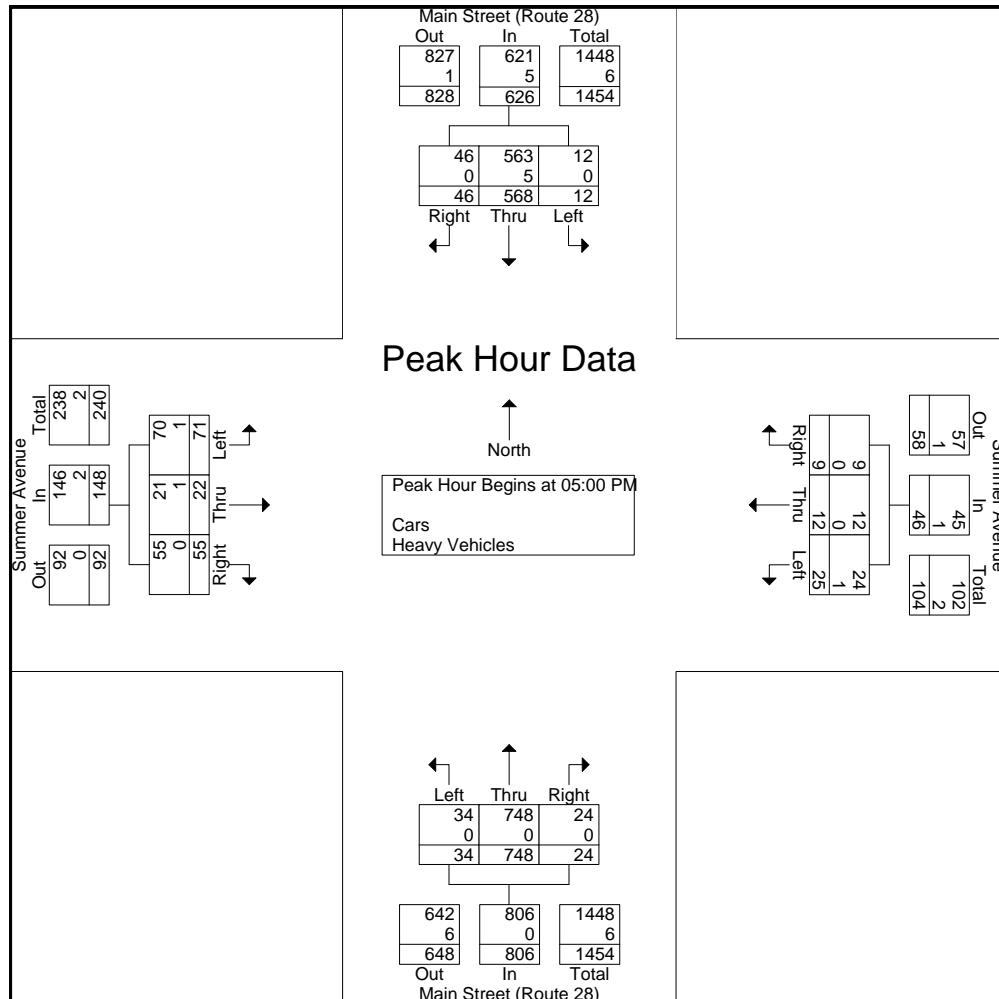
PRECISION
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	Main Street (Route 28) From North				Summer Avenue From East				Main Street (Route 28) From South				Summer Avenue From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	11	162	1	174	2	2	2	6	6	179	13	198	8	8	19	35	413
05:15 PM	11	132	3	146	4	4	10	18	5	181	2	188	21	6	13	40	392
05:30 PM	13	127	4	144	1	2	5	8	8	202	13	223	14	3	21	38	413
05:45 PM	11	147	4	162	2	4	8	14	5	186	6	197	12	5	18	35	408
Total Volume	46	568	12	626	9	12	25	46	24	748	34	806	55	22	71	148	1626
% App. Total	7.3	90.7	1.9		19.6	26.1	54.3		3	92.8	4.2		37.2	14.9	48		
PHF	.885	.877	.750	.899	.563	.750	.625	.639	.750	.926	.654	.904	.655	.688	.845	.925	.984
Cars	46	563	12	621	9	12	24	45	24	748	34	806	55	21	70	146	1618
% Cars	100	99.1	100	99.2	100	100	96.0	97.8	100	100	100	100	100	95.5	98.6	98.6	99.5
Heavy Vehicles	0	5	0	5	0	0	1	1	0	0	0	0	0	1	1	2	8
% Heavy Vehicles	0	0.9	0	0.8	0	0	4.0	2.2	0	0	0	0	0	4.5	1.4	1.4	0.5



APPENDIX B – VEHICLE ACCIDENT DATA

Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior To Crash	Vehicles Travel Directions	Most Harmful Events	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance from Nearest Roadway Intersection
Main Street at Summer Street														
30-Jun-2006	5:40 PM	Property damage only (none injured)	2	0	0	Angle		V1:Southbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear		Intersection MAIN STREET / SUMMER AVENUE
02-Jul-2006	3:03 PM	Non-fatal injury	2	1	0	Rear-end		V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 N / SUMMER AVENUE	
08-Aug-2006	1:48 PM	Property damage only (none injured)	2	0	0	Angle		V1:Westbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET / SUMMER AVENUE	
23-Sep-2006	8:42 AM	Property damage only (none injured)	1	0	0	Single vehicle crash		V1:Northbound	V1: Collision with utility pole	Wet	Daylight	Rain/Cloudy	MAIN STREET Rte 28 / SUMMER AVENUE	
29-Oct-2006	5:30 AM	Property damage only (none injured)	2	0	0	Rear-end		V1:Southbound / V2:Southbound	V1: Not reported / V2: Not reported	Dry	unknown roadway lighting	Clear	NORTH AV / SUMMER AVENUE	
16-Dec-2006	10:30 AM	Non-fatal injury	2	1	0	Rear-end		V1:Northbound / V2:Northbound	V1: Not reported / V2: Not reported	Dry	Daylight	Clear	MAIN STREET Rte 28 / SUMMER AVENUE	
23-Feb-2007	4:08 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2:Turning left	V1:Southbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Wet	Daylight	Clear	MAIN STREET / SUMMER AVENUE	
17-May-2007	11:45 AM	Non-fatal injury	2	2	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Cloudy/Cloudy		50 feet S from Intersection MAIN STREET Rte 28 S / SUMMER AVENUE
29-May-2007	4:03 PM	Property damage only (none injured)	2	0	0	Angle	V1: Turning left / V2:Travelling straight ahead	V1:Eastbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 S / SUMMER AVENUE	
17-Aug-2007	3:03 PM	Property damage only (none injured)	2	0	0	Angle	V1: Turning left / V2:Travelling straight ahead	V1:Northbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear		178 MAIN STREET / SUMMER AVENUE
23-Aug-2007	12:15 PM	Non-fatal injury	2	2	0	Angle	V1: Turning left / V2:Travelling straight ahead	V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 N / SUMMER AVENUE	
02-Nov-2007	10:55 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2:Travelling straight ahead	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET Rte 28 N / SUMMER AVENUE	
04-Jan-2008	6:36 PM	Property damage only (none injured)	2	0	0	Head-on	V1: Turning left / V2:Travelling straight ahead	V1:Northbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Dark - lighted roadway	Clear/Clear	MAIN STREET / SUMMER AVENUE	
28-Mar-2008	12:45 PM	Non-fatal injury	2	1	0	Head-on	V1: Turning left / V2:Travelling straight ahead	V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Wet	Daylight	Rain/Cloudy	MAIN STREET / SUMMER AVENUE	
05-Sep-2008	1:55 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2:Turning left	V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear		178 MAIN STREET / SUMMER AVENUE
14-Dec-2008	9:43 PM	Property damage only (none injured)	1	0	0	Single vehicle crash	V1: Turning left	V1:Southbound	V1: Collision with utility pole	Dry	Daylight	Clear/Clear	Rte 28 S / SUMMER AVENUE	
15-Dec-2008	3:32 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Travelling straight ahead / V2:Slowing or stopped in traffic	V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Not reported	Dry	Daylight	Clear/Clear	Rte 28 N / SUMMER AVENUE	
19-Dec-2008	1:15 AM	Non-fatal injury	2	1	0	Angle	V1: Travelling straight ahead / V2:Turning left	V1:Northbound / V2:Eastbound	V1: Not reported / V2: Not reported	Dry	Daylight	Clear	MAIN STREET Rte 28 / SUMMER AVENUE	
Main Street at Hopkins Street														
07-Feb-2006	10:50 AM	Property damage only (none injured)	2	0	0	Angle		V1:Northbound / V2:Northbound	V1: Not reported / V2: Not reported	Dry	Daylight	Clear	Rte 28 / HOPKINS STREET	
16-Mar-2006	5:17 PM	Property damage only (none injured)	2	0	0	Angle		V1:Northbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Dusk	Clear/Clear	Rte 28 N / HOPKINS STREET	
10-May-2006	1:00 PM	Property damage only (none injured)	2	0	0	Rear-end		V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Wet	Daylight	Cloudy/Rain	Rte 28 S / HOPKINS STREET	
10-Jul-2006	1:03 PM	Non-fatal injury	3	1	0	Head-on		V1:Northbound / V2:Southbound / V3:Northbound	V1: Not reported / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 N / HOPKINS STREET	
15-Sep-2006	6:18 PM	Property damage only (none injured)	2	0	0	Rear-end		V1:Northbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET / HOPKINS STREET	
21-Sep-2006	3:46 PM	Non-fatal injury	3	2	0	Rear-end		V1:Northbound / V2:Northbound / V3:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 / HOPKINS STREET	
23-Oct-2006	3:57 PM	Property damage only (none injured)	2	0	0	Angle		V1:Eastbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 / HOPKINS STREET	
30-Nov-2006	2:42 PM	Non-fatal injury	2	1	0	Angle		V1:Southbound / V2:Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 S / HOPKINS STREET	
25-Jan-2007	7:25 AM	Non-fatal injury	1	1	0	Single vehicle crash	V1: Travelling straight ahead	V1:Not reported	V1: Collision with pedestrian	Dry	Daylight	Clear	HOPKINS STREET / MAIN STREET Rte 28 S	
09-Feb-2007	7:50 AM	Non-fatal injury	2	1	0	Not reported	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Southbound / V2:Westbound	V1: Not reported / V2: Not reported	Dry	Daylight	Clear	MAIN STREET / HOPKINS STREET	
05-Apr-2007	6:45 PM	Property damage only (none injured)	2	0	0	Single vehicle crash	V1: Turning left / V2:Travelling straight ahead	V1:Eastbound / V2:Not reported	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Cloudy/Cloudy	HOPKINS STREET / MAIN STREET Rte 28	
07-Apr-2007	3:34 PM	Non-fatal injury	2	1	0	Angle	V1: Travelling straight ahead / V2:Turning left	V1:Southbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Cloudy/Cloudy	Rte 28 / HOPKINS STREET	
11-Apr-2007	7:58 AM	Property damage only (none injured)	2	0	0	Angle	V1: Entering traffic lane / V2:Travelling straight ahead	V1:Eastbound / V2:Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	HOPKINS STREET / MAIN STREET Rte 28	
23-May-2007	5:20 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2:Travelling straight ahead	V1:Southbound / V2:Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET / HOPKINS STREET	

Crash Date	Crash Time	Crash Severity	Number of Vehicles	Total Nonfatal Injuries	Total Fatal Injuries	Manner of Collision	Vehicle Action Prior To Crash	Vehicles Travel Directions	Most Harmful Events	Road Surface Condition	Ambient Light	Weather Condition	At Roadway Intersection	Distance from Nearest Roadway Intersection
27-Jun-2007	6:23 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2: Entering traffic lane	V1: Northbound / V2: Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Cloudy/Cloody	Rte 28 N / HOPKINS STREET	
11-Oct-2007	2:57 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: Westbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Wet	Daylight	Rain/Cloody	Rte 28 S / HOPKINS STREET	
04-Nov-2007	11:00 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Turning left / V2: Travelling straight ahead	V1: Northbound / V2: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 N / HOPKINS STREET	
01-Dec-2007	2:33 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2: Turning right	V1: Northbound / V2: Westbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 / HOPKINS STREET	
24-Dec-2007	1:35 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: Southbound / V2: Southbound	V1: Not reported / V2: Not reported	Dry	Daylight	Clear	Rte 28 / HOPKINS STREET	
16-Jan-2008	7:46 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: Southbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 S / HOPKINS STREET	
21-May-2008	2:42 PM	Property damage only (none injured)	2	0	0	Angle	V1: Turning left / V2: Travelling straight ahead	V1: Northbound / V2: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 N / HOPKINS STREET	
06-Aug-2008	9:22 AM	Non-fatal injury	2	1	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: Northbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Wet	Daylight	Rain/Rain	Rte 28 S / HOPKINS STREET	
24-Sep-2008	1:36 PM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: Not reported / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	Rte 28 S / HOPKINS STREET	
Main Street at South Street														
24-Jan-2006	7:30 AM	Property damage only (none injured)	2	0	0	Angle		V1: Eastbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET Rte 28 / SOUTH STREET	
06-Apr-2006	6:41 PM	Property damage only (none injured)	2	0	0	Angle		V1: Southbound / V2: Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Dusk	Clear/Clear	MAIN STREET Rte 28 / SOUTH STREET	
07-Apr-2006	12:25 PM	Property damage only (none injured)	2	0	0	Sideswipe, same direction		V1: Northbound / V2: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET Rte 28 / SOUTH STREET	
20-Aug-2006	2:00 PM	Property damage only (none injured)	2	0	0	Angle		V1: Eastbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET Rte 28 S / SOUTH STREET	
28-Sep-2006	1:15 PM	Property damage only (none injured)	2	0	0	Rear-end		V1: Northbound / V2: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Not reported	Not reported	Not Reported	MAIN STREET Rte 28 / SOUTH STREET	
09-Dec-2006	12:02 PM	Property damage only (none injured)	3	0	0	Angle		V1: Northbound / V2: Southbound / V3: Eastbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET Rte 28 / SOUTH STREET	
18-Aug-2007	4:42 PM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: Southbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET / SOUTH STREET	
07-Sep-2007	9:12 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: Southbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET Rte 28 S / SOUTH STREET	
29-Sep-2007	5:30 AM	Property damage only (none injured)	2	0	0	Rear-end	V1: Slowing or stopped in traffic / V2: Travelling straight ahead	V1: Northbound / V2: Northbound	V1: Not reported / V2: Not reported	Dry	Daylight	Clear	MAIN STREET / SOUTH STREET	
18-Oct-2007	11:21 AM	Property damage only (none injured)	3	0	0	Rear-end	traffic / V2: Slowing or stopped in traffic / V3: Travelling straight ahead	V1: Southbound / V2: Southbound / V3: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	Dry	Daylight	Cloudy/Cloody	MAIN STREET Rte 28 S / SOUTH STREET	
04-Dec-2007	11:27 AM	Property damage only (none injured)	2	0	0	Angle	V1: Travelling straight ahead / V2: Travelling straight ahead	V1: Westbound / V2: Southbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Cloudy/Clear	MAIN STREET Rte 28 / SOUTH STREET	
19-Feb-2008	5:30 PM	Property damage only (none injured)	2	0	0	Angle	V1: Turning left / V2: Travelling straight ahead	V1: Southbound / V2: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Dark - lighted roadway	Clear/Clear	MAIN STREET / SOUTH STREET	
17-Mar-2008	4:52 PM	Non-fatal injury	2	1	0	Rear-end	V1: Slowing or stopped in traffic / V2: Slowing or stopped in traffic	V1: Northbound / V2: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic	Dry	Daylight	Clear/Clear	MAIN STREET / SOUTH STREET	
23-Nov-2008	5:18 PM	Property damage only (none injured)	3	0	0	Rear-end	V1: Travelling straight ahead / V2: Travelling straight ahead / V3: Slowing or stopped in traffic	V1: Northbound / V2: Northbound / V3: Northbound	V1: Collision with motor vehicle in traffic / V2: Collision with motor vehicle in traffic / V3: Collision with motor vehicle in traffic	Dry	Dark - lighted roadway	Clear/Clear	MAIN STREET / SOUTH STREET	
West Street at South Street														
10-Dec-2006	11:34 PM	Property damage only (none injured)	1	0	0	Single vehicle crash		V1: Northbound	V1: Collision with unknown fixed object	Dry	Dark - lighted roadway	Clear/Clear	SOUTH STREET / WEST STREET	
24-May-2008	9:30 AM	Property damage only (none injured)	2	0	0	Sideswipe, same direction	V1: Making U-turn / V2: Not reported	V1: Southbound / V2: Not reported	V1: Not reported / V2: Not reported	Dry	Dark - lighted roadway	Clear	WEST STREET / SOUTH STREET	

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Reading COUNT DATE : 11/10
 DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : MAIN ST (Route 28)
 MINOR STREET(S) : South St.

INTERSECTION
 DIAGRAM
 (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	846	1043	147	175		2211

"K" FACTOR :

7.6

INTERSECTION ADT (V) = TOTAL DAILY
 APPROACH VOLUME :

29,092

TOTAL # OF CRASHES :

14

OF
 YEARS :

3

AVERAGE # OF
 CRASHES PER YEAR (A) :

4.67

CRASH RATE CALCULATION :

0.44

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments :

Project Title & Date:

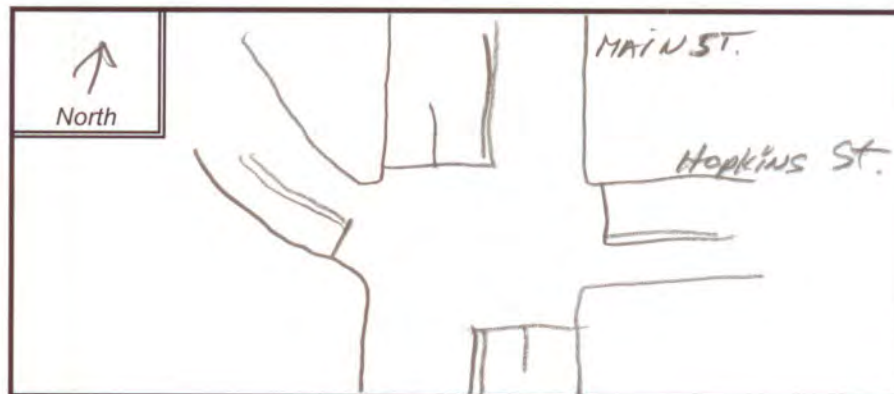
INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Reading COUNT DATE : 11/10
 DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : MAIN ST (Route 28)
 MINOR STREET(S) : Hopkins St.

INTERSECTION
 DIAGRAM
 (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	785	968	177	91		2021

"K" FACTOR :

7.6

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

26,592

TOTAL # OF CRASHES :

23

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

7.66

CRASH RATE CALCULATION :

0.79

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments : _____

Project Title & Date: _____

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Reading COUNT DATE : 11/10
 DISTRICT : 4 UNSIGNALIZED : ☐ SIGNALIZED : ☒

~ INTERSECTION DATA ~

MAJOR STREET : MAIN ST. (Route 28)
 MINOR STREET(S) : SUMMER ST.

INTERSECTION
 DIAGRAM
 (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	631	834	157	83		1705

"K" FACTOR :

7.6

INTERSECTION ADT (V) = TOTAL DAILY APPROACH VOLUME :

22,434

TOTAL # OF CRASHES :

18

OF YEARS :

3

AVERAGE # OF CRASHES PER YEAR (A) :

6.00

CRASH RATE CALCULATION :

0.73

$$\text{RATE} = \frac{(A * 1,000,000)}{(V * 365)}$$

Comments :

Project Title & Date :

INTERSECTION CRASH RATE WORKSHEET

CITY/TOWN : Reading COUNT DATE : 11/10
 DISTRICT : 4 UNSIGNALIZED : ☒ SIGNALIZED : ☐

~ INTERSECTION DATA ~

MAJOR STREET : West St.
 MINOR STREET(S) : South St.

INTERSECTION
 DIAGRAM
 (Label Approaches)



PEAK HOUR VOLUMES

APPROACH :	1	2	3	4	5	Total Peak Hourly Approach Volume
DIRECTION :	NB	SB	EB	WB		
PEAK HOURLY VOLUMES (AM/PM) :	193	66	755	649		1663

"K" FACTOR :

7.6

INTERSECTION ADT (V) = TOTAL DAILY
 APPROACH VOLUME :

21,882

TOTAL # OF CRASHES :

2

OF
 YEARS :

3

AVERAGE # OF
 CRASHES PER YEAR (A) :

0.67

CRASH RATE CALCULATION :

0.08













RATE =

$$\frac{(A * 1,000,000)}{(V * 365)}$$

Comments :

Project Title & Date :

APPENDIX C – LEVEL OF SERVICE ANALYSIS

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	15	14	151	80	111	511	23	1274
Lane Group Flow (vph)	0	113	0	281	0	667	0	1431
Turn Type	Perm		Perm		Perm		pm+pt	
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	8.0	10.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	10.0	21.0
Total Split (s)	23.0	23.0	23.0	23.0	41.0	41.0	11.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	54.7%	54.7%	14.7%	69.3%
Maximum Green (s)	18.0	18.0	18.0	18.0	36.0	36.0	9.0	49.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?							Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	None	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0
Act Effct Green (s)		16.7		16.7		39.8		39.8
Actuated g/C Ratio		0.26		0.26		0.62		0.62
v/c Ratio		0.25		0.76		0.52		0.70
Control Delay		11.1		36.2		9.2		11.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		11.1		36.2		9.2		11.0
LOS		B		D		A		B
Approach Delay		11.1		36.2		9.2		11.0
Approach LOS		B		D		A		B
Queue Length 50th (ft)		13		91		74		191
Queue Length 95th (ft)		54		#229		114		259
Internal Link Dist (ft)		90		813		100		660
Turn Bay Length (ft)								
Base Capacity (vph)		501		408		1285		2194
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.23		0.69		0.52		0.65













Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 64.6
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.76

Intersection Signal Delay: 13.3 Intersection LOS: B
 Intersection Capacity Utilization 87.0% ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: South Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	16	15	159	84	116	537	24	1338
Lane Group Flow (vph)	0	119	0	295	0	700	0	1502
Turn Type	Perm		Perm		Perm		pm+pt	
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	8.0	10.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	10.0	21.0
Total Split (s)	23.0	23.0	23.0	23.0	41.0	41.0	11.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	54.7%	54.7%	14.7%	69.3%
Maximum Green (s)	18.0	18.0	18.0	18.0	36.0	36.0	9.0	49.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?							Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	None	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0
Act Effct Green (s)		17.3		17.3		40.4		40.4
Actuated g/C Ratio		0.26		0.26		0.61		0.61
v/c Ratio		0.26		0.79		0.57		0.74
Control Delay		13.3		39.8		9.9		11.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		13.3		39.8		9.9		11.8
LOS		B		D		A		B
Approach Delay		13.3		39.8		9.9		11.8
Approach LOS		B		D		A		B
Queue Length 50th (ft)		18		98		82		208
Queue Length 95th (ft)		63		#257		125		283
Internal Link Dist (ft)		90		813		100		660
Turn Bay Length (ft)								
Base Capacity (vph)		490		401		1238		2174
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.24		0.74		0.57		0.69













Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 65.8
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79

Intersection Signal Delay: 14.5 Intersection LOS: B
 Intersection Capacity Utilization 90.6% ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: South Street & Main Street



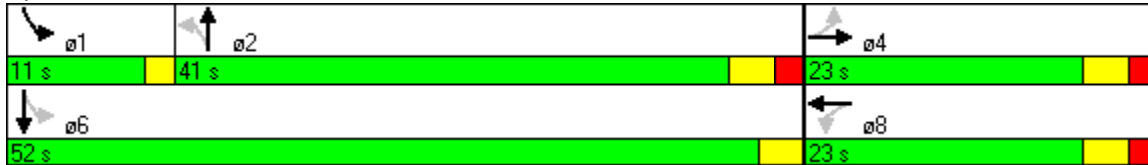
								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	36	19	159	85	135	537	24	1338
Lane Group Flow (vph)	0	242	0	296	0	720	0	1507
Turn Type	Perm		Perm		Perm		pm+pt	
Protected Phases		4		8		2	1	6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	1	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	8.0	10.0
Minimum Split (s)	21.0	21.0	21.0	21.0	21.0	21.0	10.0	21.0
Total Split (s)	23.0	23.0	23.0	23.0	41.0	41.0	11.0	52.0
Total Split (%)	30.7%	30.7%	30.7%	30.7%	54.7%	54.7%	14.7%	69.3%
Maximum Green (s)	18.0	18.0	18.0	18.0	36.0	36.0	9.0	49.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?							Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	None	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0
Act Effct Green (s)		19.1		19.1		39.9		39.9
Actuated g/C Ratio		0.29		0.29		0.60		0.60
v/c Ratio		0.51		0.95		0.89dl		0.76
Control Delay		20.4		68.6		11.7		13.0
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		20.4		68.6		11.7		13.0
LOS		C		E		B		B
Approach Delay		20.4		68.6		11.7		13.0
Approach LOS		C		E		B		B
Queue Length 50th (ft)		57		107		88		210
Queue Length 95th (ft)		144		#301		136		284
Internal Link Dist (ft)		90		813		100		660
Turn Bay Length (ft)								
Base Capacity (vph)		477		310		1138		2122
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.51		0.95		0.63		0.71

Intersection Summary

Cycle Length: 75
Actuated Cycle Length: 67
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95

Intersection Signal Delay: 19.2 Intersection LOS: B
 Intersection Capacity Utilization 101.8% ICU Level of Service G
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 5: South Street & Main Street



	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔		↔		↔
Volume (vph)	19	85	135	537	24	1338
Lane Group Flow (vph)	242	296	0	720	0	1507
Turn Type			pm+pt		Perm	
Protected Phases	4	8	5	2		6
Permitted Phases			2		6	
Detector Phases	4	8	5	2	6	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0
Minimum Split (s)	21.0	21.0	15.5	21.0	21.0	21.0
Total Split (s)	21.0	21.0	15.5	58.0	42.5	42.5
Total Split (%)	21.0%	21.0%	15.5%	58.0%	42.5%	42.5%
Maximum Green (s)	16.0	16.0	10.0	53.0	37.5	37.5
Yellow Time (s)	3.0	3.0	3.5	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	Max	Min	Min
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	13.5	17.0		54.0		54.0
Actuated g/C Ratio	0.14	0.18		0.56		0.56
v/c Ratio	0.69	0.93		1.43dl		0.82
Control Delay	28.0	75.0		20.4		22.5
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	28.0	75.0		20.4		22.5
LOS	C	E		C		C
Approach Delay	28.0	75.0		20.4		22.5
Approach LOS	C	E		C		C
Queue Length 50th (ft)	59	175		154		363
Queue Length 95th (ft)	141	#352		250		515
Internal Link Dist (ft)	90	813		100		660
Turn Bay Length (ft)						
Base Capacity (vph)	396	319		1030		1837
Starvation Cap Reductn	0	0		0		0
Spillback Cap Reductn	0	0		0		0
Storage Cap Reductn	0	0		0		0
Reduced v/c Ratio	0.61	0.93		0.70		0.82













Intersection Summary

Cycle Length: 100
Actuated Cycle Length: 96.6
Natural Cycle: 120
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.93

Intersection Signal Delay: 28.0 Intersection LOS: C
 Intersection Capacity Utilization 101.8% ICU Level of Service G
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 dl Defacto Left Lane. Recode with 1 though lane as a left lane.

Splits and Phases: 5: South Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	29	58	50	14	65	961	22	666
Lane Group Flow (vph)	0	188	0	84	0	1069	0	732
Turn Type	Perm		Perm		pm+pt		Perm	
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	5	2	6	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	21.0	21.0	21.0	21.0	10.5	21.0	21.0	21.0
Total Split (s)	30.0	30.0	30.0	30.0	17.0	62.0	45.0	45.0
Total Split (%)	32.6%	32.6%	32.6%	32.6%	18.5%	67.4%	48.9%	48.9%
Maximum Green (s)	25.0	25.0	25.0	25.0	12.0	57.0	40.0	40.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0		0	0	0
Act Effct Green (s)		13.5		13.5		58.1		41.0
Actuated g/C Ratio		0.17		0.17		0.73		0.52
v/c Ratio		0.56		0.33		0.47		0.44
Control Delay		26.9		27.6		5.2		13.4
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		26.9		27.6		5.2		13.4
LOS		C		C		A		B
Approach Delay		26.9		27.6		5.2		13.4
Approach LOS		C		C		A		B
Queue Length 50th (ft)		57		30		80		107
Queue Length 95th (ft)		119		69		151		176
Internal Link Dist (ft)		90		813		100		660
Turn Bay Length (ft)								
Base Capacity (vph)		514		414		2284		1653
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.37		0.20		0.47		0.44

Intersection Summary













Cycle Length: 92
Actuated Cycle Length: 79.6
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.56

Intersection Signal Delay: 11.0
Intersection Capacity Utilization 73.3%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service D

Splits and Phases: 5: South Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	30	61	53	15	68	1053	23	736
Lane Group Flow (vph)	0	197	0	89	0	1167	0	805
Turn Type	Perm		Perm		pm+pt		Perm	
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	5	2	6	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	21.0	21.0	21.0	21.0	10.5	21.0	21.0	21.0
Total Split (s)	30.0	30.0	30.0	30.0	17.0	62.0	45.0	45.0
Total Split (%)	32.6%	32.6%	32.6%	32.6%	18.5%	67.4%	48.9%	48.9%
Maximum Green (s)	25.0	25.0	25.0	25.0	12.0	57.0	40.0	40.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0		0	0	0
Act Effct Green (s)		13.9		13.9		58.1		41.1
Actuated g/C Ratio		0.17		0.17		0.73		0.51
v/c Ratio		0.58		0.35		0.53		0.49
Control Delay		27.7		28.0		5.8		14.3
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		27.7		28.0		5.8		14.3
LOS		C		C		A		B
Approach Delay		27.7		28.0		5.8		14.3
Approach LOS		C		C		A		B
Queue Length 50th (ft)		61		32		94		124
Queue Length 95th (ft)		125		73		176		202
Internal Link Dist (ft)		90		813		100		660
Turn Bay Length (ft)								
Base Capacity (vph)		513		406		2216		1638
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.38		0.22		0.53		0.49

Intersection Summary













Cycle Length: 92
Actuated Cycle Length: 80
Natural Cycle: 55
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58

Intersection Signal Delay: 11.6
 Intersection Capacity Utilization 78.9%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 5: South Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	40	63	53	19	158	1053	23	736
Lane Group Flow (vph)	0	253	0	93	0	1258	0	826
Turn Type	Perm		Perm		pm+pt		Perm	
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	5	2	6	6
Minimum Initial (s)	10.0	10.0	10.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)	21.0	21.0	21.0	21.0	10.5	21.0	21.0	21.0
Total Split (s)	30.0	30.0	30.0	30.0	17.0	62.0	45.0	45.0
Total Split (%)	32.6%	32.6%	32.6%	32.6%	18.5%	67.4%	48.9%	48.9%
Maximum Green (s)	25.0	25.0	25.0	25.0	12.0	57.0	40.0	40.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0		0	0	0
Act Effct Green (s)		15.9		15.9		58.2		41.1
Actuated g/C Ratio		0.19		0.19		0.71		0.50
v/c Ratio		0.67		0.35		0.72		0.52
Control Delay		29.8		27.6		9.2		15.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		29.8		27.6		9.2		15.8
LOS		C		C		A		B
Approach Delay		29.8		27.6		9.2		15.8
Approach LOS		C		C		A		B
Queue Length 50th (ft)		82		35		122		138
Queue Length 95th (ft)		158		76		231		228
Internal Link Dist (ft)		90		813		100		660
Turn Bay Length (ft)								
Base Capacity (vph)		517		378		1758		1585
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.49		0.25		0.72		0.52

Intersection Summary

Cycle Length: 92
 Actuated Cycle Length: 82.1
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.72

Intersection Signal Delay: 14.3
Intersection Capacity Utilization 82.3%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service E

Splits and Phases: 5: South Street & Main Street



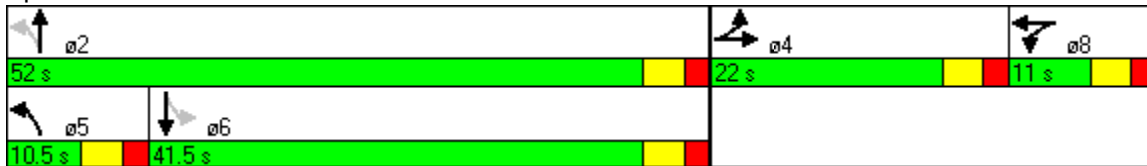
	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔		↔		↔
Volume (vph)	63	19	158	1053	23	736
Lane Group Flow (vph)	253	93	0	1258	0	826
Turn Type			pm+pt		Perm	
Protected Phases	4	8	5	2		6
Permitted Phases			2		6	
Detector Phases	4	8	5	2	6	6
Minimum Initial (s)	10.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)	22.0	11.0	10.5	21.0	21.0	21.0
Total Split (s)	22.0	11.0	10.5	52.0	41.5	41.5
Total Split (%)	25.9%	12.9%	12.4%	61.2%	48.8%	48.8%
Maximum Green (s)	17.0	6.0	5.5	47.0	36.5	36.5
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	Max	Max	Min	Min
Walk Time (s)	5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effct Green (s)	14.7	6.9		48.4		37.8
Actuated g/C Ratio	0.18	0.08		0.61		0.47
v/c Ratio	0.67	0.57		0.88		0.55
Control Delay	30.5	47.1		22.9		17.4
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	30.5	47.1		22.9		17.4
LOS	C	D		C		B
Approach Delay	30.5	47.1		22.9		17.4
Approach LOS	C	D		C		B
Queue Length 50th (ft)	84	40		198		154
Queue Length 95th (ft)	161	#103		#363		226
Internal Link Dist (ft)	90	813		100		660
Turn Bay Length (ft)						
Base Capacity (vph)	434	164		1429		1507
Starvation Cap Reductn	0	0		0		0
Spillback Cap Reductn	0	0		0		0
Storage Cap Reductn	0	0		0		0
Reduced v/c Ratio	0.58	0.57		0.88		0.55













Intersection Summary

Cycle Length: 85
Actuated Cycle Length: 79.6
Natural Cycle: 90
Control Type: Semi Act-Uncoord
Maximum v/c Ratio: 0.88

Intersection Signal Delay: 22.8 Intersection LOS: C
 Intersection Capacity Utilization 82.3% ICU Level of Service E
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: South Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	64	16	50	51	41	402	9	972
Lane Group Flow (vph)	0	177	0	128	0	490	0	1120
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	25.0	25.0	25.0	25.0	66.0	66.0	66.0	66.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%	72.5%	72.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	60.0	60.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
Act Effct Green (s)		14.1		14.1		64.4		64.4
Actuated g/C Ratio		0.16		0.16		0.74		0.74
v/c Ratio		0.63		0.52		0.24		0.46
Control Delay		32.6		37.1		4.2		5.5
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		32.6		37.1		4.2		5.5
LOS		C		D		A		A
Approach Delay		32.6		37.1		4.2		5.5
Approach LOS		C		D		A		A
Queue Length 50th (ft)		60		58		33		95
Queue Length 95th (ft)		125		111		70		182
Internal Link Dist (ft)		740		880		1120		3144
Turn Bay Length (ft)								
Base Capacity (vph)		367		336		2062		2460
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.48		0.38		0.24		0.46

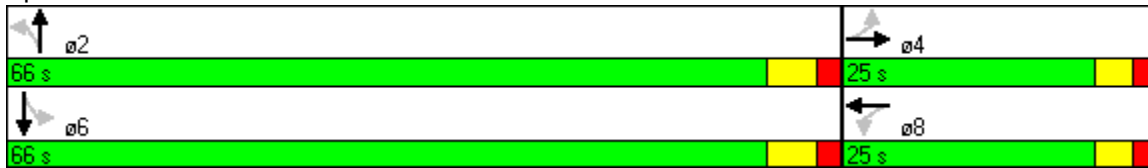
Intersection Summary













Cycle Length: 91
 Actuated Cycle Length: 86.6
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.63

Intersection Signal Delay: 9.8
Intersection Capacity Utilization 62.1%
Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service B

Splits and Phases: 11: Summer Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	71	22	25	12	34	748	12	568
Lane Group Flow (vph)	0	150	0	47	0	822	0	639
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	25.0	25.0	25.0	25.0	66.0	66.0	66.0	66.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%	72.5%	72.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	60.0	60.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
Act Effct Green (s)		14.0		14.0		70.8		70.8
Actuated g/C Ratio		0.15		0.15		0.76		0.76
v/c Ratio		0.60		0.20		0.33		0.25
Control Delay		35.6		27.2		4.3		3.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		35.6		27.2		4.3		3.8
LOS		D		C		A		A
Approach Delay		35.6		27.2		4.3		3.8
Approach LOS		D		C		A		A
Queue Length 50th (ft)		59		18		60		42
Queue Length 95th (ft)		115		47		113		81
Internal Link Dist (ft)		740		880		1120		3144
Turn Bay Length (ft)								
Base Capacity (vph)		344		328		2459		2528
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.44		0.14		0.33		0.25

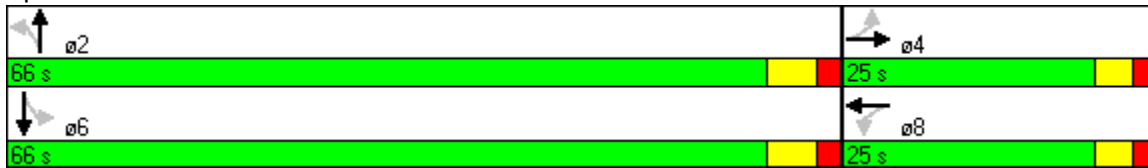
Intersection Summary













Cycle Length: 91
Actuated Cycle Length: 92.9
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.60

Intersection Signal Delay: 7.6
Intersection Capacity Utilization 59.9%
Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service B

Splits and Phases: 11: Summer Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	67	17	53	54	42	422	9	1021
Lane Group Flow (vph)	0	186	0	135	0	514	0	1176
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	25.0	25.0	25.0	25.0	66.0	66.0	66.0	66.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%	72.5%	72.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	60.0	60.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
Act Effct Green (s)		14.5		14.5		64.1		64.1
Actuated g/C Ratio		0.17		0.17		0.74		0.74
v/c Ratio		0.65		0.55		0.25		0.48
Control Delay		33.9		38.1		4.4		5.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		33.9		38.1		4.4		5.8
LOS		C		D		A		A
Approach Delay		33.9		38.1		4.4		5.8
Approach LOS		C		D		A		A
Queue Length 50th (ft)		64		61		36		106
Queue Length 95th (ft)		131		117		74		196
Internal Link Dist (ft)		740		880		1120		3144
Turn Bay Length (ft)								
Base Capacity (vph)		365		331		2033		2447
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.51		0.41		0.25		0.48

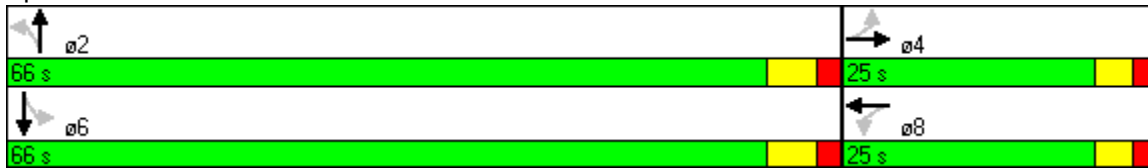
Intersection Summary













Cycle Length: 91
Actuated Cycle Length: 86.6
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65

Intersection Signal Delay: 10.2
Intersection Capacity Utilization 63.9%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service B

Splits and Phases: 11: Summer Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	75	23	26	13	37	804	13	619
Lane Group Flow (vph)	0	162	0	49	0	885	0	694
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	25.0	25.0	25.0	25.0	66.0	66.0	66.0	66.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%	72.5%	72.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	60.0	60.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
Act Effct Green (s)		14.5		14.5		69.1		69.1
Actuated g/C Ratio		0.16		0.16		0.75		0.75
v/c Ratio		0.62		0.19		0.37		0.28
Control Delay		36.3		27.0		4.7		4.1
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		36.3		27.0		4.7		4.1
LOS		D		C		A		A
Approach Delay		36.3		27.0		4.7		4.1
Approach LOS		D		C		A		A
Queue Length 50th (ft)		64		18		69		48
Queue Length 95th (ft)		124		48		131		94
Internal Link Dist (ft)		740		880		1120		3144
Turn Bay Length (ft)								
Base Capacity (vph)		347		341		2412		2497
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.47		0.14		0.37		0.28

Intersection Summary













Cycle Length: 91
Actuated Cycle Length: 91.7
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62

Intersection Signal Delay: 8.0
Intersection Capacity Utilization 63.8%
Analysis Period (min) 15

Intersection LOS: A
ICU Level of Service B

Splits and Phases: 11: Summer Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	67	17	53	54	43	437	9	1024
Lane Group Flow (vph)	0	186	0	135	0	531	0	1179
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	25.0	25.0	25.0	25.0	66.0	66.0	66.0	66.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%	72.5%	72.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	60.0	60.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
Act Effct Green (s)		14.5		14.5		64.1		64.1
Actuated g/C Ratio		0.17		0.17		0.74		0.74
v/c Ratio		0.65		0.55		0.26		0.48
Control Delay		33.9		38.1		4.4		5.8
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		33.9		38.1		4.4		5.8
LOS		C		D		A		A
Approach Delay		33.9		38.1		4.4		5.8
Approach LOS		C		D		A		A
Queue Length 50th (ft)		64		61		38		106
Queue Length 95th (ft)		131		117		76		196
Internal Link Dist (ft)		740		880		1120		3144
Turn Bay Length (ft)								
Base Capacity (vph)		365		331		2030		2447
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.51		0.41		0.26		0.48

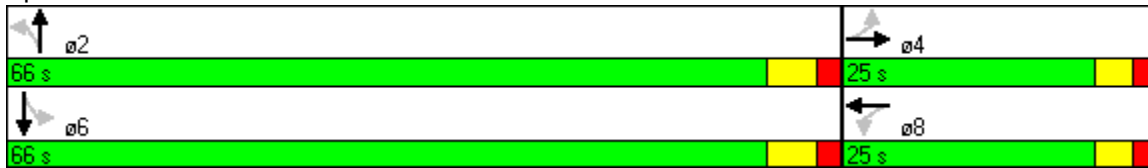
Intersection Summary













Cycle Length: 91
Actuated Cycle Length: 86.6
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.65

Intersection Signal Delay: 10.2
Intersection Capacity Utilization 65.1%
Analysis Period (min) 15

Intersection LOS: B
ICU Level of Service C

Splits and Phases: 11: Summer Street & Main Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	75	23	26	13	37	811	13	634
Lane Group Flow (vph)	0	162	0	49	0	893	0	709
Turn Type	Perm		Perm		Perm		Perm	
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phases	4	4	8	8	2	2	6	6
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	21.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	25.0	25.0	25.0	25.0	66.0	66.0	66.0	66.0
Total Split (%)	27.5%	27.5%	27.5%	27.5%	72.5%	72.5%	72.5%	72.5%
Maximum Green (s)	20.0	20.0	20.0	20.0	60.0	60.0	60.0	60.0
Yellow Time (s)	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag								
Lead-Lag Optimize?								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Max	Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0
Act Effct Green (s)		14.5		14.5		69.1		69.1
Actuated g/C Ratio		0.16		0.16		0.75		0.75
v/c Ratio		0.62		0.19		0.37		0.28
Control Delay		36.3		27.0		4.8		4.2
Queue Delay		0.0		0.0		0.0		0.0
Total Delay		36.3		27.0		4.8		4.2
LOS		D		C		A		A
Approach Delay		36.3		27.0		4.8		4.2
Approach LOS		D		C		A		A
Queue Length 50th (ft)		64		18		70		50
Queue Length 95th (ft)		124		48		132		96
Internal Link Dist (ft)		740		880		1120		3144
Turn Bay Length (ft)								
Base Capacity (vph)		347		341		2410		2500
Starvation Cap Reductn		0		0		0		0
Spillback Cap Reductn		0		0		0		0
Storage Cap Reductn		0		0		0		0
Reduced v/c Ratio		0.47		0.14		0.37		0.28

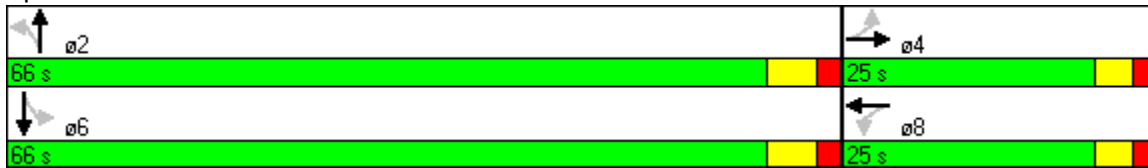
Intersection Summary

















Cycle Length: 91
Actuated Cycle Length: 91.7
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.62

















Intersection Signal Delay: 7.9
Intersection Capacity Utilization 64.4%
Analysis Period (min) 15

















Intersection LOS: A
ICU Level of Service C

















Splits and Phases: 11: Summer Street & Main Street



































												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	9	259	3	35	56	93	478	7	38	1178	7
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	9	267	3	36	58	96	493	7	39	1214	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)								740			1200	
pX, platoon unblocked	0.97	0.97	0.97	0.97	0.97		0.97					
vC, conflicting volume	1810	1988	611	1645	1988	250	1222			500		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1804	1988	565	1634	1988	250	1196			500		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	80	41	84	23	92	83			96		
cM capacity (veh/h)	14	47	453	19	47	750	561			1060		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	276	97	342	254	646	614						
Volume Left	0	3	96	0	39	0						
Volume Right	267	58	0	7	0	7						
cSH	350	96	561	1700	1060	1700						
Volume to Capacity	0.79	1.01	0.17	0.15	0.04	0.36						
Queue Length 95th (ft)	164	153	15	0	3	0						
Control Delay (s)	44.5	176.7	5.4	0.0	1.0	0.0						
Lane LOS	E	F	A		A							
Approach Delay (s)	44.5	176.7	3.1		0.5							
Approach LOS	E	F										
Intersection Summary												
Average Delay			14.3									
Intersection Capacity Utilization			76.5%		ICU Level of Service					D		
Analysis Period (min)			15									










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	9	272	3	37	59	98	502	7	40	1237	7
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	9	280	3	38	61	101	518	7	41	1275	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								740			1200	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1902	2088	641	1728	2088	262	1282			525		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1896	2093	561	1712	2093	262	1240			525		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	76	37	78	0	92	81			96		
cM capacity (veh/h)	0	38	445	14	38	736	526			1038		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	290	102	360	266	679	645						
Volume Left	0	3	101	0	41	0						
Volume Right	280	61	0	7	0	7						
cSH	331	78	526	1700	1038	1700						
Volume to Capacity	0.88	1.31	0.19	0.16	0.04	0.38						
Queue Length 95th (ft)	204	197	18	0	3	0						
Control Delay (s)	59.1	302.1	6.0	0.0	1.0	0.0						
Lane LOS	F	F	A		A							
Approach Delay (s)	59.1	302.1	3.4		0.5							
Approach LOS	F	F										
Intersection Summary												
Average Delay			21.7									
Intersection Capacity Utilization			79.8%		ICU Level of Service					D		
Analysis Period (min)			15									










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	0	9	273	3	37	59	103	517	7	40	1240	7
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	0	9	281	3	38	61	106	533	7	41	1278	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)								740			1200	
pX, platoon unblocked	0.94	0.94	0.94	0.94	0.94		0.94					
vC, conflicting volume	1923	2117	643	1757	2117	270	1286			540		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1919	2124	561	1742	2124	270	1243			540		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	74	37	76	0	92	80			96		
cM capacity (veh/h)	0	36	444	13	36	728	525			1024		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	291	102	373	274	680	646						
Volume Left	0	3	106	0	41	0						
Volume Right	281	61	0	7	0	7						
cSH	325	73	525	1700	1024	1700						
Volume to Capacity	0.89	1.40	0.20	0.16	0.04	0.38						
Queue Length 95th (ft)	213	206	19	0	3	0						
Control Delay (s)	63.0	340.8	6.2	0.0	1.0	0.0						
Lane LOS	F	F	A		A							
Approach Delay (s)	63.0	340.8	3.6		0.5							
Approach LOS	F	F										
Intersection Summary												
Average Delay			23.7									
Intersection Capacity Utilization			80.5%		ICU Level of Service					D		
Analysis Period (min)			15									















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	4	80	4	10	74	128	835	29	68	611	34
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	1	4	82	4	10	76	131	852	30	69	623	35
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)								740			1200	
pX, platoon unblocked	0.93	0.93		0.93	0.93	0.93				0.93		
vC, conflicting volume	1547	1922	329	1662	1925	441	658			882		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1512	1916	329	1636	1919	320	658			795		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	92	88	90	79	88	86			91		
cM capacity (veh/h)	48	49	670	43	49	630	932			769		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	87	90	557	456	381	346						
Volume Left	1	4	131	0	69	0						
Volume Right	82	76	0	30	0	35						
cSH	383	212	932	1700	769	1700						
Volume to Capacity	0.23	0.42	0.14	0.27	0.09	0.20						
Queue Length 95th (ft)	21	49	12	0	7	0						
Control Delay (s)	17.1	34.0	3.6	0.0	2.8	0.0						
Lane LOS	C	D	A		A							
Approach Delay (s)	17.1	34.0	2.0		1.4							
Approach LOS	C	D										
Intersection Summary												
Average Delay			4.0									
Intersection Capacity Utilization			65.5%		ICU Level of Service					C		
Analysis Period (min)			15									

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	4	87	4	11	78	137	898	31	71	668	36
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	1	4	89	4	11	80	140	916	32	72	682	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)								740			1200	
pX, platoon unblocked	0.90	0.90		0.90	0.90	0.90				0.90		
vC, conflicting volume	1668	2072	359	1788	2075	474	718			948		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1633	2080	359	1766	2083	313	718			837		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	89	86	87	69	87	84			90		
cM capacity (veh/h)	33	37	640	31	36	621	885			723		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	94	95	598	490	413	378						
Volume Left	1	4	140	0	72	0						
Volume Right	89	80	0	32	0	37						
cSH	334	167	885	1700	723	1700						
Volume to Capacity	0.28	0.57	0.16	0.29	0.10	0.22						
Queue Length 95th (ft)	28	74	14	0	8	0						
Control Delay (s)	19.9	51.5	3.9	0.0	2.9	0.0						
Lane LOS	C	F	A		A							
Approach Delay (s)	19.9	51.5	2.2		1.5							
Approach LOS	C	F										
Intersection Summary												
Average Delay			5.0									
Intersection Capacity Utilization			69.7%		ICU Level of Service					C		
Analysis Period (min)			15									

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	1	4	92	4	11	78	140	905	31	71	683	36
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Hourly flow rate (vph)	1	4	94	4	11	80	143	923	32	72	697	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)								740			1200	
pX, platoon unblocked	0.89	0.89		0.89	0.89	0.89				0.89		
vC, conflicting volume	1693	2101	367	1814	2104	478	734			955		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1655	2114	367	1791	2116	288	734			825		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	88	85	86	67	87	84			90		
cM capacity (veh/h)	31	34	633	29	34	633	874			718		
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2						
Volume Total	99	95	605	493	421	385						
Volume Left	1	4	143	0	72	0						
Volume Right	94	80	0	32	0	37						
cSH	328	158	874	1700	718	1700						
Volume to Capacity	0.30	0.60	0.16	0.29	0.10	0.23						
Queue Length 95th (ft)	31	80	15	0	8	0						
Control Delay (s)	20.6	57.0	4.0	0.0	2.9	0.0						
Lane LOS	C	F	A		A							
Approach Delay (s)	20.6	57.0	2.2		1.5							
Approach LOS	C	F										
Intersection Summary												
Average Delay			5.3									
Intersection Capacity Utilization			70.4%		ICU Level of Service					C		
Analysis Period (min)			15									

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	112	4	24	257	19	117
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	118	4	25	271	20	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)				170		
pX, platoon unblocked						
vC, conflicting volume			122		441	120
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			122		441	120
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		96	87
cM capacity (veh/h)			1465		564	931
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	122	296	143			
Volume Left	0	25	20			
Volume Right	4	0	123			
cSH	1700	1465	854			
Volume to Capacity	0.07	0.02	0.17			
Queue Length 95th (ft)	0	1	15			
Control Delay (s)	0.0	0.8	10.1			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.8	10.1			
Approach LOS			B			
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			36.5%	ICU Level of Service	A	
Analysis Period (min)			15			

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	195	18	114	122	9	56
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99
Hourly flow rate (vph)	197	18	115	123	9	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh						
Upstream signal (ft)				170		
pX, platoon unblocked						
vC, conflicting volume			215		560	206
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			215		560	206
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		98	93
cM capacity (veh/h)			1361		450	837
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	215	238	66			
Volume Left	0	115	9			
Volume Right	18	0	57			
cSH	1700	1361	748			
Volume to Capacity	0.13	0.08	0.09			
Queue Length 95th (ft)	0	7	7			
Control Delay (s)	0.0	4.2	10.3			
Lane LOS		A	B			
Approach Delay (s)	0.0	4.2	10.3			
Approach LOS			B			
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			38.0%	ICU Level of Service		A
Analysis Period (min)			15			

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	13	237	6	947	296	5	28	5
Lane Group Flow (vph)	14	300	7	1041	0	350	0	115
Turn Type	Prot		Perm		Perm		Perm	
Protected Phases	7	4		8		2		6
Permitted Phases			8		2		6	
Detector Phases	7	4	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	8.0	91.0	83.0	83.0	49.0	49.0	49.0	49.0
Total Split (%)	5.7%	65.0%	59.3%	59.3%	35.0%	35.0%	35.0%	35.0%
Maximum Green (s)	6.0	86.0	78.0	78.0	43.0	43.0	43.0	43.0
Yellow Time (s)	2.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Min	Min	Max	Max
Walk Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0
Act Effct Green (s)	3.8	81.3	78.3	78.3		45.1		45.1
Actuated g/C Ratio	0.03	0.60	0.58	0.58		0.34		0.34
v/c Ratio	0.29	0.27	0.01	0.96		0.89		0.21
Control Delay	81.0	12.7	13.2	46.7		68.4		13.4
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	81.0	12.7	13.2	46.7		68.4		13.4
LOS	F	B	B	D		E		B
Approach Delay		15.7		46.5		68.4		13.4
Approach LOS		B		D		E		B
Queue Length 50th (ft)	12	113	2	771		280		21
Queue Length 95th (ft)	38	163	10	#1235		#505		70
Internal Link Dist (ft)		919		1283		1488		844
Turn Bay Length (ft)	100		100					
Base Capacity (vph)	51	1138	629	1089		392		551
Starvation Cap Reductn	0	0	0	0		0		0
Spillback Cap Reductn	0	0	0	0		0		0
Storage Cap Reductn	0	0	0	0		0		0
Reduced v/c Ratio	0.27	0.26	0.01	0.96		0.89		0.21

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 134.4
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.96

Intersection Signal Delay: 43.3

Intersection LOS: D

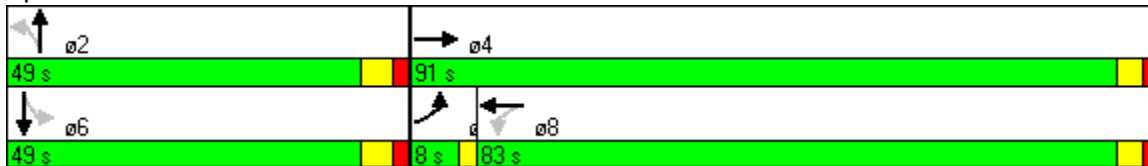
Intersection Capacity Utilization 80.9%















ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: West Street & South Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	13	249	6	994	311	5	28	5
Lane Group Flow (vph)	14	316	7	1092	0	368	0	115
Turn Type	Prot		Perm		Perm		Perm	
Protected Phases	7	4		8		2		6
Permitted Phases			8		2		6	
Detector Phases	7	4	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	8.0	91.0	83.0	83.0	49.0	49.0	49.0	49.0
Total Split (%)	5.7%	65.0%	59.3%	59.3%	35.0%	35.0%	35.0%	35.0%
Maximum Green (s)	6.0	86.0	78.0	78.0	43.0	43.0	43.0	43.0
Yellow Time (s)	2.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Min	Min	Max	Max
Walk Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0
Act Effct Green (s)	3.8	82.2	79.1	79.1		45.0		45.0
Actuated g/C Ratio	0.03	0.61	0.59	0.59		0.33		0.33
v/c Ratio	0.29	0.28	0.01	1.00		0.94		0.21
Control Delay	81.3	12.8	13.2	56.3		77.7		13.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	81.3	12.8	13.2	56.3		77.7		13.3
LOS	F	B	B	E		E		B
Approach Delay		15.7		56.1		77.7		13.3
Approach LOS		B		E		E		B
Queue Length 50th (ft)	12	120	2	862		301		21
Queue Length 95th (ft)	38	172	10	#1333		#544		70
Internal Link Dist (ft)		919		1283		1488		844
Turn Bay Length (ft)	100		100					
Base Capacity (vph)	51	1138	620	1089		390		548
Starvation Cap Reductn	0	0	0	0		0		0
Spillback Cap Reductn	0	0	0	0		0		0
Storage Cap Reductn	0	0	0	0		0		0
Reduced v/c Ratio	0.27	0.28	0.01	1.00		0.94		0.21

Intersection Summary

Cycle Length: 140
Actuated Cycle Length: 135.2
Natural Cycle: 130
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00

Intersection Signal Delay: 50.7

Intersection LOS: D

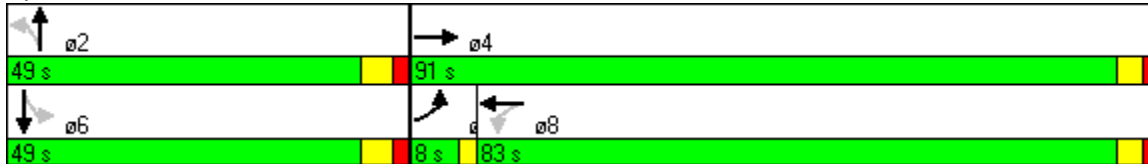
Intersection Capacity Utilization 84.3%















ICU Level of Service E

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: West Street & South Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	13	249	6	994	330	5	28	5
Lane Group Flow (vph)	14	320	7	1092	0	389	0	115
Turn Type	Prot		Perm		Perm		Perm	
Protected Phases	7	4		8		2		6
Permitted Phases			8		2		6	
Detector Phases	7	4	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	8.0	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	8.0	91.0	83.0	83.0	49.0	49.0	49.0	49.0
Total Split (%)	5.7%	65.0%	59.3%	59.3%	35.0%	35.0%	35.0%	35.0%
Maximum Green (s)	6.0	86.0	78.0	78.0	43.0	43.0	43.0	43.0
Yellow Time (s)	2.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Min	Min	Max	Max
Walk Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0
Act Effct Green (s)	3.8	82.2	79.1	79.1		45.0		45.0
Actuated g/C Ratio	0.03	0.61	0.59	0.59		0.33		0.33
v/c Ratio	0.29	0.29	0.01	1.00		1.00		0.21
Control Delay	81.3	12.9	13.2	56.3		90.5		13.3
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	81.3	12.9	13.2	56.3		90.5		13.3
LOS	F	B	B	E		F		B
Approach Delay		15.7		56.1		90.5		13.3
Approach LOS		B		E		F		B
Queue Length 50th (ft)	12	122	2	862		327		21
Queue Length 95th (ft)	38	174	10	#1333		#590		70
Internal Link Dist (ft)		919		1283		1488		844
Turn Bay Length (ft)	100		100					
Base Capacity (vph)	51	1136	618	1089		389		549
Starvation Cap Reductn	0	0	0	0		0		0
Spillback Cap Reductn	0	0	0	0		0		0
Storage Cap Reductn	0	0	0	0		0		0
Reduced v/c Ratio	0.27	0.28	0.01	1.00		1.00		0.21

Intersection Summary

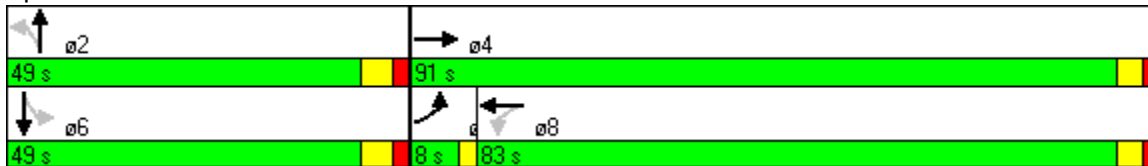
Cycle Length: 140
Actuated Cycle Length: 135.2
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.00















Intersection Signal Delay: 53.5
Intersection Capacity Utilization 85.4%
Analysis Period (min) 15

Intersection LOS: D
ICU Level of Service E

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: West Street & South Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	31	978	22	320	50	3	9	3
Lane Group Flow (vph)	33	1269	23	342	0	71	0	29
Turn Type	Prot		Perm		Perm		Perm	
Protected Phases	7	4		8		2		6
Permitted Phases			8		2		6	
Detector Phases	7	4	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	9.5	68.0	58.5	58.5	22.0	22.0	22.0	22.0
Total Split (%)	10.6%	75.6%	65.0%	65.0%	24.4%	24.4%	24.4%	24.4%
Maximum Green (s)	4.5	63.0	53.5	53.5	17.0	17.0	17.0	17.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Min	Min	Max	Max
Walk Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0
Act Effct Green (s)	5.5	61.4	55.9	55.9		18.1		18.1
Actuated g/C Ratio	0.06	0.70	0.64	0.64		0.21		0.21
v/c Ratio	0.30	0.97	0.26	0.28		0.23		0.08
Control Delay	48.4	32.4	17.5	8.4		27.9		19.1
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	48.4	32.4	17.5	8.4		27.9		19.1
LOS	D	C	B	A		C		B
Approach Delay		32.8		8.9		27.9		19.1
Approach LOS		C		A		C		B
Queue Length 50th (ft)	18	546	6	85		28		6
Queue Length 95th (ft)	48	#972	26	132		65		29
Internal Link Dist (ft)		919		1283		1488		844
Turn Bay Length (ft)	100		100					
Base Capacity (vph)	109	1324	89	1217		311		347
Starvation Cap Reductn	0	0	0	0		0		0
Spillback Cap Reductn	0	0	0	0		0		0
Storage Cap Reductn	0	0	0	0		0		0
Reduced v/c Ratio	0.30	0.96	0.26	0.28		0.23		0.08















Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 87.5
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.97

Intersection Signal Delay: 27.4 Intersection LOS: C
Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 14: West Street & South Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	31	1027	23	336	53	3	9	3
Lane Group Flow (vph)	33	1333	24	359	0	75	0	29
Turn Type	Prot		Perm		Perm		Perm	
Protected Phases	7	4		8		2		6
Permitted Phases			8		2		6	
Detector Phases	7	4	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	9.5	68.0	58.5	58.5	22.0	22.0	22.0	22.0
Total Split (%)	10.6%	75.6%	65.0%	65.0%	24.4%	24.4%	24.4%	24.4%
Maximum Green (s)	4.5	63.0	53.5	53.5	17.0	17.0	17.0	17.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Min	Min	Max	Max
Walk Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0
Act Effct Green (s)	5.5	64.0	58.3	58.3		18.0		18.0
Actuated g/C Ratio	0.06	0.71	0.65	0.65		0.20		0.20
v/c Ratio	0.31	1.01	0.27	0.29		0.25		0.09
Control Delay	48.9	41.0	17.8	8.4		27.8		19.2
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	48.9	41.0	17.8	8.4		27.8		19.2
LOS	D	D	B	A		C		B
Approach Delay		41.2		9.0		27.8		19.2
Approach LOS		D		A		C		B
Queue Length 50th (ft)	18	~668	6	90		29		6
Queue Length 95th (ft)	48	#1053	27	139		68		29
Internal Link Dist (ft)		919		1283		1488		844
Turn Bay Length (ft)	100		100					
Base Capacity (vph)	106	1324	90	1230		302		336
Starvation Cap Reductn	0	0	0	0		0		0
Spillback Cap Reductn	0	0	0	0		0		0
Storage Cap Reductn	0	0	0	0		0		0
Reduced v/c Ratio	0.31	1.01	0.27	0.29		0.25		0.09

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.01















Intersection Signal Delay: 33.7
 Intersection Capacity Utilization 82.6%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service E

- ~ Volume exceeds capacity, queue is theoretically infinite.
 Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 14: West Street & South Street



								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Volume (vph)	31	1027	23	336	62	3	9	3
Lane Group Flow (vph)	33	1353	24	359	0	85	0	29
Turn Type	Prot		Perm		Perm		Perm	
Protected Phases	7	4		8		2		6
Permitted Phases			8		2		6	
Detector Phases	7	4	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	9.5	21.5	21.5	21.5	22.0	22.0	22.0	22.0
Total Split (s)	9.5	68.0	58.5	58.5	22.0	22.0	22.0	22.0
Total Split (%)	10.6%	75.6%	65.0%	65.0%	24.4%	24.4%	24.4%	24.4%
Maximum Green (s)	4.5	63.0	53.5	53.5	17.0	17.0	17.0	17.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes		Yes	Yes				
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode	None	None	None	None	Min	Min	Max	Max
Walk Time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0
Act Effct Green (s)	5.5	64.0	58.3	58.3		18.0		18.0
Actuated g/C Ratio	0.06	0.71	0.65	0.65		0.20		0.20
v/c Ratio	0.31	1.02	0.27	0.29		0.29		0.09
Control Delay	48.9	45.8	17.8	8.4		29.4		19.2
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0
Total Delay	48.9	45.8	17.8	8.4		29.4		19.2
LOS	D	D	B	A		C		B
Approach Delay		45.8		9.0		29.4		19.2
Approach LOS		D		A		C		B
Queue Length 50th (ft)	18	~822	6	90		35		6
Queue Length 95th (ft)	48	#1078	27	139		78		29
Internal Link Dist (ft)		919		1283		1488		844
Turn Bay Length (ft)	100		100					
Base Capacity (vph)	106	1322	90	1230		296		335
Starvation Cap Reductn	0	0	0	0		0		0
Spillback Cap Reductn	0	0	0	0		0		0
Storage Cap Reductn	0	0	0	0		0		0
Reduced v/c Ratio	0.31	1.02	0.27	0.29		0.29		0.09

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.02

Intersection Signal Delay: 37.2

Intersection LOS: D

Intersection Capacity Utilization 84.9%

ICU Level of Service E

Analysis Period (min) 15

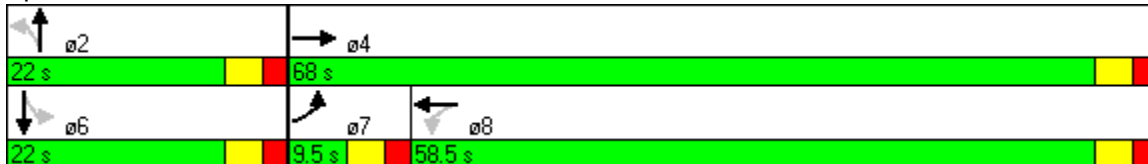
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 14: West Street & South Street



TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Dermot J. Kelly, PE, PTOE	Intersection	Main St @ 128 SB Off Ramp
Agency/Co.	DJK Associates, Inc.	Jurisdiction	Reading, MA
Date Performed	11/24/2010	Analysis Year	2010 Existing
Analysis Time Period	Morning Peak Hour		
Project Description 809 Marchionda, Reading, MA			
East/West Street: Route 128 SB Off Ramp		North/South Street: Main Street	
Intersection Orientation: North-South		Study Period (hrs): 0.25	

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	590	0	0	0	0
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	0	614	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	0	0
Configuration		T				
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	72	0	0	0
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	0	0	75	0	0	0
Percent Heavy Vehicles	0	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (vph)					75			
C (m) (vph)					733			
v/c					0.10			
95% queue length					0.34			
Control Delay					10.5			
LOS					B			
Approach Delay	--	--	10.5					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst *Dermot J. Kelly, PE, PTOE*
 Agency/Co. *DJK Associates, Inc.*
 Date Performed *11/24/2010*
 Analysis Time Period *Morning Peak Hour*

Site Information

Intersection *Main St @ 128 SB Off Ramp*
 Jurisdiction *Reading, MA*
 Analysis Year *2015 No Buid*

Project Description *809 Marchionda, Reading, MA*

East/West Street: *Route 128 SB Off Ramp*

North/South Street: *Main Street*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	620	0	0	0	0
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	0	645	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	0	0
Configuration		T				
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	76	0	0	0
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	0	0	79	0	0	0
Percent Heavy Vehicles	0	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (vph)					79			
C (m) (vph)					719			
v/c					0.11			
95% queue length					0.37			
Control Delay					10.6			
LOS					B			
Approach Delay	--	--	10.6					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Dermot J. Kelly, PE, PTOE	Intersection	Main St @ 128 SB Off Ramp
Agency/Co.	DJK Associates, Inc.	Jurisdiction	Reading, MA
Date Performed	11/24/2010	Analysis Year	2015 Buid
Analysis Time Period	Morning Peak Hour		
Project Description 809 Marchionda, Reading, MA			
East/West Street: Route 128 SB Off Ramp		North/South Street: Main Street	
Intersection Orientation: North-South		Study Period (hrs): 0.25	

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	636	0	0	0	0
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	0	662	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	0	0
Configuration		T				
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	79	0	0	0
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	0	0	82	0	0	0
Percent Heavy Vehicles	0	0	2	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (vph)					82			
C (m) (vph)					711			
v/c					0.12			
95% queue length					0.39			
Control Delay					10.7			
LOS					B			
Approach Delay	--	--	10.7					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Dermot J. Kelly, PE, PTOE	Intersection	Main St @ 128 SB Off Ramp
Agency/Co.	DJK Associates, Inc.	Jurisdiction	Reading, MA
Date Performed	11/24/2010	Analysis Year	2010 Existing
Analysis Time Period	Evening Peak Hour		
Project Description 809 Marchionda, Reading, MA			
East/West Street: Route 128 SB Off Ramp		North/South Street: Main Street	
Intersection Orientation: North-South		Study Period (hrs): 0.25	

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	885	0	0	0	0
Peak-Hour Factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Hourly Flow Rate, HFR	0	893	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	0	0
Configuration		T				
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	182	0	0	0
Peak-Hour Factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Hourly Flow Rate, HFR	0	0	183	0	0	0
Percent Heavy Vehicles	0	0	1	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (vph)					183			
C (m) (vph)					614			
v/c					0.30			
95% queue length					1.25			
Control Delay					13.3			
LOS					B			
Approach Delay	--	--	13.3					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst *Dermot J. Kelly, PE, PTOE*
 Agency/Co. *DJK Associates, Inc.*
 Date Performed *11/24/2010*
 Analysis Time Period *Evening Peak Hour*

Site Information

Intersection *Main St @ 128 SB Off Ramp*
 Jurisdiction *Reading, MA*
 Analysis Year *2015 No Build*

Project Description *809 Marchionda, Reading, MA*

East/West Street: *Route 128 SB Off Ramp*

North/South Street: *Main Street*

Intersection Orientation: *North-South*

Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	965	0	0	0	0
Peak-Hour Factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Hourly Flow Rate, HFR	0	974	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	0	0
Configuration		T				
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	199	0	0	0
Peak-Hour Factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Hourly Flow Rate, HFR	0	0	201	0	0	0
Percent Heavy Vehicles	0	0	1	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (vph)					201			
C (m) (vph)					583			
v/c					0.34			
95% queue length					1.53			
Control Delay					14.4			
LOS					B			
Approach Delay	--	--	14.4					
Approach LOS	--	--	B					

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TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	Dermot J. Kelly, PE, PTOE	Intersection	Main St @ 128 SB Off Ramp
Agency/Co.	DJK Associates, Inc.	Jurisdiction	Reading, MA
Date Performed	11/24/2010	Analysis Year	2015 Build
Analysis Time Period	Evening Peak Hour		
Project Description 809 Marchionda, Reading, MA			
East/West Street: Route 128 SB Off Ramp		North/South Street: Main Street	
Intersection Orientation: North-South		Study Period (hrs): 0.25	

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	0	1042	0	0	0	0
Peak-Hour Factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Hourly Flow Rate, HFR	0	1052	0	0	0	0
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	0	2	0	0	0	0
Configuration		T				
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	212	0	0	0
Peak-Hour Factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99
Hourly Flow Rate, HFR	0	0	214	0	0	0
Percent Heavy Vehicles	0	0	1	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	0
Configuration			R			

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration					R			
v (vph)					214			
C (m) (vph)					554			
v/c					0.39			
95% queue length					1.81			
Control Delay					15.5			
LOS					C			
Approach Delay	--	--	15.5					
Approach LOS	--	--	C					

















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














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














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











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














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














												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.90			0.98			1.00			0.99	
Flt Protected		0.99			0.97			0.99			1.00	
Satd. Flow (prot)		1668			1778			3499			3512	
Flt Permitted		0.95			0.79			0.59			0.94	
Satd. Flow (perm)		1593			1441			2067			3304	
Volume (vph)	15	14	78	151	80	36	111	511	11	23	1274	63
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	16	15	82	159	84	38	117	538	12	24	1341	66
RTOR Reduction (vph)	0	49	0	0	7	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	64	0	0	274	0	0	666	0	0	1426	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.7			15.7			38.8			40.8	
Effective Green, g (s)		16.7			16.7			39.8			39.8	
Actuated g/C Ratio		0.26			0.26			0.62			0.62	
Clearance Time (s)		5.0			5.0			5.0			3.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		412			373			1275			2039	
v/s Ratio Prot												
v/s Ratio Perm		0.04			c0.19			0.32			c0.43	
v/c Ratio		0.16			0.73			0.52			0.70	
Uniform Delay, d1		18.5			21.9			7.0			8.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			7.3			1.5			1.1	
Delay (s)		18.6			29.2			8.5			9.4	
Level of Service		B			C			A			A	
Approach Delay (s)		18.6			29.2			8.5			9.4	
Approach LOS		B			C			A			A	
Intersection Summary												
HCM Average Control Delay			11.8			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			64.5			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			87.0%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.90			0.98			1.00			0.99	
Flt Protected		0.99			0.97			0.99			1.00	
Satd. Flow (prot)		1669			1778			3499			3512	
Flt Permitted		0.95			0.78			0.57			0.94	
Satd. Flow (perm)		1590			1423			2002			3300	
Volume (vph)	16	15	82	159	84	38	116	537	12	24	1338	66
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	17	16	86	167	88	40	122	565	13	25	1408	69
RTOR Reduction (vph)	0	42	0	0	7	0	0	1	0	0	5	0
Lane Group Flow (vph)	0	77	0	0	288	0	0	699	0	0	1497	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm			Perm			pm+pt		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		16.3			16.3			39.4			41.4	
Effective Green, g (s)		17.3			17.3			40.4			40.4	
Actuated g/C Ratio		0.26			0.26			0.61			0.61	
Clearance Time (s)		5.0			5.0			5.0			3.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		419			375			1231			2029	
v/s Ratio Prot												
v/s Ratio Perm		0.05			c0.20			0.35			c0.45	
v/c Ratio		0.18			0.77			0.57			0.74	
Uniform Delay, d1		18.7			22.3			7.5			8.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			9.1			1.9			1.4	
Delay (s)		18.9			31.4			9.4			10.4	
Level of Service		B			C			A			B	
Approach Delay (s)		18.9			31.4			9.4			10.4	
Approach LOS		B			C			A			B	
Intersection Summary												
HCM Average Control Delay			12.9			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			65.7			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			90.6%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.90			0.98			1.00			0.99	
Flt Protected		0.99			0.97			0.99			1.00	
Satd. Flow (prot)		1658			1779			3495			3510	
Flt Permitted		0.99			0.97			0.51			0.94	
Satd. Flow (perm)		1658			1779			1787			3287	
Volume (vph)	41	20	193	159	85	38	135	537	12	24	1338	70
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	43	21	203	167	89	40	142	565	13	25	1408	74
RTOR Reduction (vph)	0	99	0	0	6	0	0	1	0	0	4	0
Lane Group Flow (vph)	0	168	0	0	290	0	0	719	0	0	1503	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split			Split			Perm			pm+pt		
Protected Phases	4	4		8	8			2		1	6	
Permitted Phases							2			6		
Actuated Green, G (s)		13.3			16.8			45.4			47.4	
Effective Green, g (s)		14.3			17.8			46.4			46.4	
Actuated g/C Ratio		0.16			0.20			0.51			0.51	
Clearance Time (s)		5.0			5.0			5.0			3.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		262			350			916			1685	
v/s Ratio Prot		c0.10			c0.16							
v/s Ratio Perm								0.40			c0.46	
v/c Ratio		0.64			0.83			1.48dl			0.89	
Uniform Delay, d1		35.7			34.9			18.0			19.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.1			14.9			6.7			6.4	
Delay (s)		40.8			49.8			24.7			26.2	
Level of Service		D			D			C			C	
Approach Delay (s)		40.8			49.8			24.7			26.2	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM Average Control Delay			29.7			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			90.5			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			103.2%			ICU Level of Service			G			
Analysis Period (min)			15									
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.90			0.98			1.00			0.99	
Flt Protected		0.99			0.97			0.99			1.00	
Satd. Flow (prot)		1659			1779			3495			3510	
Flt Permitted		0.99			0.97			0.50			0.93	
Satd. Flow (perm)		1659			1779			1759			3282	
Volume (vph)	36	19	175	159	85	38	135	537	12	24	1338	70
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	38	20	184	167	89	40	142	565	13	25	1408	74
RTOR Reduction (vph)	0	119	0	0	6	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	123	0	0	290	0	0	719	0	0	1504	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Split			Split			pm+pt			Perm		
Protected Phases	4	4		8	8		5	2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		12.5			16.0			53.0			53.0	
Effective Green, g (s)		13.5			17.0			54.0			54.0	
Actuated g/C Ratio		0.14			0.18			0.56			0.56	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		232			313			984			1837	
v/s Ratio Prot		c0.07			c0.16							
v/s Ratio Perm								0.41			c0.46	
v/c Ratio		0.53			0.93			1.43dl			0.82	
Uniform Delay, d1		38.6			39.1			15.8			17.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.3			32.2			2.8			3.0	
Delay (s)		40.9			71.4			18.6			20.3	
Level of Service		D			E			B			C	
Approach Delay (s)		40.9			71.4			18.6			20.3	
Approach LOS		D			E			B			C	
Intersection Summary												
HCM Average Control Delay			27.1			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			96.5			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			101.8%			ICU Level of Service			G			
Analysis Period (min)			15									
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.93			0.97			1.00			0.99	
Flt Protected		0.99			0.97			1.00			1.00	
Satd. Flow (prot)		1733			1770			3547			3542	
Flt Permitted		0.94			0.60			0.87			0.91	
Satd. Flow (perm)		1644			1096			3102			3213	
Volume (vph)	29	58	99	50	14	19	65	961	32	22	666	37
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	29	59	100	51	14	19	66	971	32	22	673	37
RTOR Reduction (vph)	0	51	0	0	13	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	137	0	0	71	0	0	1067	0	0	728	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.5			12.5			57.1			40.1	
Effective Green, g (s)		13.5			13.5			58.1			41.1	
Actuated g/C Ratio		0.17			0.17			0.73			0.52	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		279			186			2337			1659	
v/s Ratio Prot								c0.07				
v/s Ratio Perm		c0.08			0.06			c0.26			0.23	
v/c Ratio		0.49			0.38			0.46			0.44	
Uniform Delay, d1		29.9			29.3			4.4			12.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.4			1.3			0.6			0.2	
Delay (s)		31.3			30.6			5.0			12.2	
Level of Service		C			C			A			B	
Approach Delay (s)		31.3			30.6			5.0			12.2	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM Average Control Delay			11.0			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.46									
Actuated Cycle Length (s)			79.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			73.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.93			0.97			1.00			0.99	
Flt Protected		0.99			0.97			1.00			1.00	
Satd. Flow (prot)		1733			1770			3548			3543	
Flt Permitted		0.94			0.58			0.86			0.90	
Satd. Flow (perm)		1648			1066			3074			3197	
Volume (vph)	30	61	104	53	15	20	68	1053	34	23	736	39
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	30	62	105	54	15	20	69	1064	34	23	743	39
RTOR Reduction (vph)	0	51	0	0	13	0	0	2	0	0	3	0
Lane Group Flow (vph)	0	146	0	0	76	0	0	1165	0	0	802	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.9			12.9			57.1			40.1	
Effective Green, g (s)		13.9			13.9			58.1			41.1	
Actuated g/C Ratio		0.17			0.17			0.73			0.51	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		286			185			2310			1642	
v/s Ratio Prot								c0.08				
v/s Ratio Perm		c0.09			0.07			c0.28			0.25	
v/c Ratio		0.51			0.41			0.50			0.49	
Uniform Delay, d1		30.0			29.4			4.7			12.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.4			1.5			0.8			0.2	
Delay (s)		31.4			30.9			5.5			12.9	
Level of Service		C			C			A			B	
Approach Delay (s)		31.4			30.9			5.5			12.9	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM Average Control Delay			11.4			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			78.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.92			0.97			1.00			0.99	
Flt Protected		0.99			0.97			0.99			1.00	
Satd. Flow (prot)		1718			1775			3537			3530	
Flt Permitted		0.94			0.55			0.65			0.90	
Satd. Flow (perm)		1630			1010			2305			3167	
Volume (vph)	40	63	148	53	19	20	158	1053	34	23	736	59
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	40	64	149	54	19	20	160	1064	34	23	743	60
RTOR Reduction (vph)	0	63	0	0	12	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	190	0	0	81	0	0	1256	0	0	821	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm			pm+pt			Perm		
Protected Phases		4			8			5	2		6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.9			14.9			57.2			40.2	
Effective Green, g (s)		15.9			15.9			58.2			41.2	
Actuated g/C Ratio		0.19			0.19			0.71			0.50	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		316			196			1829			1589	
v/s Ratio Prot								c0.11				
v/s Ratio Perm		c0.12			0.08			c0.38			0.26	
v/c Ratio		0.60			0.41			0.69			0.52	
Uniform Delay, d1		30.2			29.0			6.8			13.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.2			1.4			2.1			0.3	
Delay (s)		33.4			30.4			8.9			14.0	
Level of Service		C			C			A			B	
Approach Delay (s)		33.4			30.4			8.9			14.0	
Approach LOS		C			C			A			B	
Intersection Summary												
HCM Average Control Delay			14.0			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			82.1			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			82.3%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.92			0.97			1.00			0.99	
Flt Protected		0.99			0.97			0.99			1.00	
Satd. Flow (prot)		1718			1775			3537			3530	
Flt Permitted		0.99			0.97			0.63			0.90	
Satd. Flow (perm)		1718			1775			2228			3165	
Volume (vph)	40	63	148	53	19	20	158	1053	34	23	736	59
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	40	64	149	54	19	20	160	1064	34	23	743	60
RTOR Reduction (vph)	0	63	0	0	12	0	0	2	0	0	6	0
Lane Group Flow (vph)	0	190	0	0	81	0	0	1256	0	0	820	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Split			Split			pm+pt			Perm		
Protected Phases	4	4		8	8		5	2			6	
Permitted Phases							2			6		
Actuated Green, G (s)		13.7			4.6			47.4			36.9	
Effective Green, g (s)		14.7			5.6			48.4			37.9	
Actuated g/C Ratio		0.18			0.07			0.60			0.47	
Clearance Time (s)		5.0			5.0			5.0			5.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		313			123			1442			1486	
v/s Ratio Prot		c0.11			c0.05			c0.07				
v/s Ratio Perm								c0.45			0.26	
v/c Ratio		0.61			0.66			0.87			0.55	
Uniform Delay, d1		30.3			36.6			13.5			15.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.3			12.0			7.5			0.4	
Delay (s)		33.7			48.6			21.0			15.8	
Level of Service		C			D			C			B	
Approach Delay (s)		33.7			48.6			21.0			15.8	
Approach LOS		C			D			C			B	
Intersection Summary												
HCM Average Control Delay			21.6			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			80.7			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			82.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.93			0.98			1.00			0.99	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1684			1770			3474			3473	
Flt Permitted		0.79			0.73			0.80			0.95	
Satd. Flow (perm)		1355			1325			2783			3302	
Volume (vph)	64	16	85	50	51	18	41	402	13	9	972	60
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	69	17	91	54	55	19	44	432	14	10	1045	65
RTOR Reduction (vph)	0	45	0	0	8	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	132	0	0	120	0	0	488	0	0	1116	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.1			13.1			62.5			62.5	
Effective Green, g (s)		14.1			14.1			64.5			64.5	
Actuated g/C Ratio		0.16			0.16			0.74			0.74	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		221			216			2073			2459	
v/s Ratio Prot												
v/s Ratio Perm		c0.10			0.09			0.18			c0.34	
v/c Ratio		0.60			0.56			0.24			0.45	
Uniform Delay, d1		33.6			33.4			3.4			4.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		4.3			3.1			0.3			0.6	
Delay (s)		37.9			36.5			3.7			4.9	
Level of Service		D			D			A			A	
Approach Delay (s)		37.9			36.5			3.7			4.9	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM Average Control Delay			9.7			HCM Level of Service			A			
HCM Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			86.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			62.1%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.93			0.98			1.00			0.99	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1684			1770			3474			3473	
Flt Permitted		0.78			0.72			0.79			0.95	
Satd. Flow (perm)		1345			1309			2760			3303	
Volume (vph)	67	17	89	53	54	19	42	422	14	9	1021	63
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	72	18	96	57	58	20	45	454	15	10	1098	68
RTOR Reduction (vph)	0	46	0	0	7	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	140	0	0	128	0	0	512	0	0	1172	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.5			13.5			62.1			62.1	
Effective Green, g (s)		14.5			14.5			64.1			64.1	
Actuated g/C Ratio		0.17			0.17			0.74			0.74	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		225			219			2043			2445	
v/s Ratio Prot												
v/s Ratio Perm		c0.10			0.10			0.19			c0.35	
v/c Ratio		0.62			0.58			0.25			0.48	
Uniform Delay, d1		33.5			33.3			3.6			4.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.3			3.9			0.3			0.7	
Delay (s)		38.8			37.2			3.9			5.2	
Level of Service		D			D			A			A	
Approach Delay (s)		38.8			37.2			3.9			5.2	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM Average Control Delay			10.1			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			86.6			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			63.9%			ICU Level of Service				B		
Analysis Period (min)			15									
c Critical Lane Group												



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.93			0.98			1.00			0.99	
Flt Protected		0.98			0.98			1.00			1.00	
Satd. Flow (prot)		1684			1770			3475			3473	
Flt Permitted		0.78			0.72			0.79			0.95	
Satd. Flow (perm)		1345			1309			2756			3302	
Volume (vph)	67	17	89	53	54	19	43	437	14	9	1024	63
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	72	18	96	57	58	20	46	470	15	10	1101	68
RTOR Reduction (vph)	0	46	0	0	7	0	0	2	0	0	4	0
Lane Group Flow (vph)	0	140	0	0	128	0	0	529	0	0	1175	0
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.5			13.5			62.1			62.1	
Effective Green, g (s)		14.5			14.5			64.1			64.1	
Actuated g/C Ratio		0.17			0.17			0.74			0.74	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		225			219			2040			2444	
v/s Ratio Prot												
v/s Ratio Perm		c0.10			0.10			0.19			c0.36	
v/c Ratio		0.62			0.58			0.26			0.48	
Uniform Delay, d1		33.5			33.3			3.6			4.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.3			3.9			0.3			0.7	
Delay (s)		38.8			37.2			3.9			5.2	
Level of Service		D			D			A			A	
Approach Delay (s)		38.8			37.2			3.9			5.2	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM Average Control Delay			10.1			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			86.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			65.1%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.95			0.97			1.00			0.99	
Flt Protected		0.98			0.97			1.00			1.00	
Satd. Flow (prot)		1745			1783			3551			3532	
Flt Permitted		0.85			0.79			0.91			0.94	
Satd. Flow (perm)		1522			1445			3225			3314	
Volume (vph)	71	22	55	25	12	9	34	748	24	12	568	46
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	72	22	56	26	12	9	35	763	24	12	580	47
RTOR Reduction (vph)	0	26	0	0	8	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	124	0	0	39	0	0	820	0	0	634	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.0			13.0			68.8			68.8	
Effective Green, g (s)		14.0			14.0			70.8			70.8	
Actuated g/C Ratio		0.15			0.15			0.76			0.76	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		230			218			2460			2528	
v/s Ratio Prot												
v/s Ratio Perm		c0.08			0.03			c0.25			0.19	
v/c Ratio		0.54			0.18			0.33			0.25	
Uniform Delay, d1		36.4			34.4			3.5			3.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.4			0.4			0.4			0.2	
Delay (s)		38.8			34.8			3.9			3.5	
Level of Service		D			C			A			A	
Approach Delay (s)		38.8			34.8			3.9			3.5	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM Average Control Delay			7.7			HCM Level of Service			A			
HCM Volume to Capacity ratio			0.37									
Actuated Cycle Length (s)			92.8			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			59.9%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.95			0.98			1.00			0.99	
Flt Protected		0.98			0.97			1.00			1.00	
Satd. Flow (prot)		1743			1785			3550			3533	
Flt Permitted		0.85			0.78			0.90			0.94	
Satd. Flow (perm)		1519			1437			3200			3308	
Volume (vph)	75	23	61	26	13	9	37	804	26	13	619	48
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	77	23	62	27	13	9	38	820	27	13	632	49
RTOR Reduction (vph)	0	27	0	0	8	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	135	0	0	41	0	0	883	0	0	689	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.5			13.5			67.1			67.1	
Effective Green, g (s)		14.5			14.5			69.1			69.1	
Actuated g/C Ratio		0.16			0.16			0.75			0.75	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		240			227			2414			2495	
v/s Ratio Prot												
v/s Ratio Perm		c0.09			0.03			c0.28			0.21	
v/c Ratio		0.56			0.18			0.37			0.28	
Uniform Delay, d1		35.6			33.4			3.8			3.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.0			0.4			0.4			0.3	
Delay (s)		38.6			33.8			4.2			3.8	
Level of Service		D			C			A			A	
Approach Delay (s)		38.6			33.8			4.2			3.8	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM Average Control Delay			8.0			HCM Level of Service			A			
HCM Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			91.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			63.8%			ICU Level of Service			B			
Analysis Period (min)			15									
c Critical Lane Group												



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.95			0.98			1.00			0.99	
Flt Protected		0.98			0.97			1.00			1.00	
Satd. Flow (prot)		1743			1785			3550			3534	
Flt Permitted		0.85			0.78			0.90			0.94	
Satd. Flow (perm)		1519			1437			3197			3309	
Volume (vph)	75	23	61	26	13	9	37	811	26	13	634	48
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	77	23	62	27	13	9	38	828	27	13	647	49
RTOR Reduction (vph)	0	27	0	0	8	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	135	0	0	41	0	0	891	0	0	704	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		13.5			13.5			67.1			67.1	
Effective Green, g (s)		14.5			14.5			69.1			69.1	
Actuated g/C Ratio		0.16			0.16			0.75			0.75	
Clearance Time (s)		5.0			5.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		240			227			2412			2496	
v/s Ratio Prot												
v/s Ratio Perm		c0.09			0.03			c0.28			0.21	
v/c Ratio		0.56			0.18			0.37			0.28	
Uniform Delay, d1		35.6			33.4			3.8			3.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.0			0.4			0.4			0.3	
Delay (s)		38.6			33.8			4.3			3.8	
Level of Service		D			C			A			A	
Approach Delay (s)		38.6			33.8			4.3			3.8	
Approach LOS		D			C			A			A	
Intersection Summary												
HCM Average Control Delay			8.0			HCM Level of Service				A		
HCM Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			91.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			64.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.99			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.99	
Satd. Flow (prot)	1770	1825		1770	1863			1766			1668	
Flt Permitted	0.95	1.00		0.56	1.00			0.64			0.88	
Satd. Flow (perm)	1770	1825		1043	1863			1174			1481	
Volume (vph)	13	237	36	6	947	0	296	5	18	28	5	72
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	14	260	40	7	1041	0	325	5	20	31	5	79
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	53	0
Lane Group Flow (vph)	14	296	0	7	1041	0	0	349	0	0	62	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)	2.3	81.5		77.2	77.2			43.1			43.1	
Effective Green, g (s)	0.3	82.5		78.2	78.2			45.1			45.1	
Actuated g/C Ratio	0.00	0.61		0.58	0.58			0.33			0.33	
Clearance Time (s)	2.0	5.0		5.0	5.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	4	1110		601	1074			390			493	
v/s Ratio Prot	c0.01	0.16			c0.56							
v/s Ratio Perm				0.01				c0.30			0.04	
v/c Ratio	3.50	0.27		0.01	0.97			0.89			0.13	
Uniform Delay, d1	67.6	12.4		12.2	27.5			43.0			31.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1575.0	0.1		0.0	20.1			22.0			0.5	
Delay (s)	1642.7	12.5		12.2	47.7			64.9			32.1	
Level of Service	F	B		B	D			E			C	
Approach Delay (s)		85.2			47.5			64.9			32.1	
Approach LOS		F			D			E			C	
Intersection Summary												
HCM Average Control Delay			56.3			HCM Level of Service				E		
HCM Volume to Capacity ratio			0.95									
Actuated Cycle Length (s)			135.6			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			80.9%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.99			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.99	
Satd. Flow (prot)	1770	1826		1770	1863			1766			1668	
Flt Permitted	0.95	1.00		0.55	1.00			0.63			0.88	
Satd. Flow (perm)	1770	1826		1019	1863			1172			1483	
Volume (vph)	13	249	38	6	994	0	311	5	19	28	5	72
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	14	274	42	7	1092	0	342	5	21	31	5	79
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	53	0
Lane Group Flow (vph)	14	312	0	7	1092	0	0	367	0	0	62	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)	2.3	82.4		78.1	78.1			43.0			43.0	
Effective Green, g (s)	0.3	83.4		79.1	79.1			45.0			45.0	
Actuated g/C Ratio	0.00	0.61		0.58	0.58			0.33			0.33	
Clearance Time (s)	2.0	5.0		5.0	5.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	4	1116		591	1080			387			489	
v/s Ratio Prot	c0.01	0.17			c0.59							
v/s Ratio Perm				0.01				c0.31			0.04	
v/c Ratio	3.50	0.28		0.01	1.01			0.95			0.13	
Uniform Delay, d1	68.0	12.4		12.1	28.7			44.5			32.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1575.0	0.1		0.0	30.2			32.1			0.5	
Delay (s)	1643.0	12.6		12.1	58.8			76.7			32.5	
Level of Service	F	B		B	E			E			C	
Approach Delay (s)		81.7			58.5			76.7			32.5	
Approach LOS		F			E			E			C	
Intersection Summary												
HCM Average Control Delay			64.4			HCM Level of Service			E			
HCM Volume to Capacity ratio			0.99									
Actuated Cycle Length (s)			136.4			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			84.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.98		1.00	1.00			0.99			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.99	
Satd. Flow (prot)	1770	1823		1770	1863			1767			1668	
Flt Permitted	0.95	1.00		0.54	1.00			0.63			0.88	
Satd. Flow (perm)	1770	1823		1013	1863			1171			1485	
Volume (vph)	13	249	42	6	994	0	330	5	19	28	5	72
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	14	274	46	7	1092	0	363	5	21	31	5	79
RTOR Reduction (vph)	0	4	0	0	0	0	0	1	0	0	53	0
Lane Group Flow (vph)	14	316	0	7	1092	0	0	388	0	0	62	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)	2.3	82.4		78.1	78.1			43.0			43.0	
Effective Green, g (s)	0.3	83.4		79.1	79.1			45.0			45.0	
Actuated g/C Ratio	0.00	0.61		0.58	0.58			0.33			0.33	
Clearance Time (s)	2.0	5.0		5.0	5.0			6.0			6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	4	1115		587	1080			386			490	
v/s Ratio Prot	c0.01	0.17			c0.59							
v/s Ratio Perm				0.01				c0.33			0.04	
v/c Ratio	3.50	0.28		0.01	1.01			1.00			0.13	
Uniform Delay, d1	68.0	12.5		12.1	28.7			45.7			32.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	1575.0	0.1		0.0	30.2			46.9			0.5	
Delay (s)	1643.0	12.6		12.1	58.8			92.6			32.5	
Level of Service	F	B		B	E			F			C	
Approach Delay (s)		80.9			58.5			92.6			32.5	
Approach LOS		F			E			F			C	
Intersection Summary												
HCM Average Control Delay			67.7			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.01									
Actuated Cycle Length (s)			136.4			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			85.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	1.00			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1805	1849		1805	1898			1779			1729	
Flt Permitted	0.95	1.00		0.07	1.00			0.79			0.92	
Satd. Flow (perm)	1805	1849		136	1898			1459			1618	
Volume (vph)	31	978	215	22	320	2	50	3	14	9	3	15
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	1040	229	23	340	2	53	3	15	10	3	16
RTOR Reduction (vph)	0	9	0	0	0	0	0	10	0	0	13	0
Lane Group Flow (vph)	33	1260	0	23	342	0	0	61	0	0	16	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)	2.6	62.4		54.8	54.8			17.1			17.1	
Effective Green, g (s)	3.6	63.4		55.8	55.8			18.1			18.1	
Actuated g/C Ratio	0.04	0.71		0.62	0.62			0.20			0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	73	1310		85	1183			295			327	
v/s Ratio Prot	0.02	c0.68			0.18							
v/s Ratio Perm				0.17				c0.04			0.01	
v/c Ratio	0.45	0.96		0.27	0.29			0.21			0.05	
Uniform Delay, d1	42.0	11.9		7.6	7.7			29.7			28.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.4	16.6		1.7	0.1			0.3			0.3	
Delay (s)	46.4	28.5		9.4	7.9			30.1			29.1	
Level of Service	D	C		A	A			C			C	
Approach Delay (s)		29.0			8.0			30.1			29.1	
Approach LOS		C			A			C			C	
Intersection Summary												
HCM Average Control Delay			24.7			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			89.5			Sum of lost time (s)		8.0				
Intersection Capacity Utilization			78.9%			ICU Level of Service		D				
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	1.00			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1805	1849		1805	1898			1779			1729	
Flt Permitted	0.95	1.00		0.07	1.00			0.79			0.92	
Satd. Flow (perm)	1805	1849		130	1898			1450			1615	
Volume (vph)	31	1027	226	23	336	2	53	3	15	9	3	15
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	1093	240	24	357	2	56	3	16	10	3	16
RTOR Reduction (vph)	0	8	0	0	0	0	0	11	0	0	13	0
Lane Group Flow (vph)	33	1325	0	24	359	0	0	64	0	0	16	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)	2.7	65.0		57.3	57.3			17.0			17.0	
Effective Green, g (s)	3.7	66.0		58.3	58.3			18.0			18.0	
Actuated g/C Ratio	0.04	0.72		0.63	0.63			0.20			0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	73	1326		82	1203			284			316	
v/s Ratio Prot	0.02	c0.72			0.19							
v/s Ratio Perm				0.18				c0.04			0.01	
v/c Ratio	0.45	1.00		0.29	0.30			0.22			0.05	
Uniform Delay, d1	43.2	13.0		7.6	7.6			31.1			30.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.4	24.3		2.0	0.1			0.4			0.3	
Delay (s)	47.6	37.2		9.6	7.7			31.5			30.4	
Level of Service	D	D		A	A			C			C	
Approach Delay (s)		37.5			7.9			31.5			30.4	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM Average Control Delay			31.0			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			92.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			82.6%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	0.97		1.00	1.00			0.97			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1805	1845		1805	1898			1783			1729	
Flt Permitted	0.95	1.00		0.07	1.00			0.77			0.92	
Satd. Flow (perm)	1805	1845		130	1898			1426			1611	
Volume (vph)	31	1027	244	23	336	2	62	3	15	9	3	15
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	1093	260	24	357	2	66	3	16	10	3	16
RTOR Reduction (vph)	0	9	0	0	0	0	0	10	0	0	13	0
Lane Group Flow (vph)	33	1344	0	24	359	0	0	75	0	0	16	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot			Perm			Perm			Perm		
Protected Phases	7	4			8			2			6	
Permitted Phases				8			2			6		
Actuated Green, G (s)	2.7	65.0		57.3	57.3			17.0			17.0	
Effective Green, g (s)	3.7	66.0		58.3	58.3			18.0			18.0	
Actuated g/C Ratio	0.04	0.72		0.63	0.63			0.20			0.20	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	73	1324		82	1203			279			315	
v/s Ratio Prot	0.02	c0.73			0.19							
v/s Ratio Perm				0.18				c0.05			0.01	
v/c Ratio	0.45	1.01		0.29	0.30			0.27			0.05	
Uniform Delay, d1	43.2	13.0		7.6	7.6			31.4			30.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	4.4	28.5		2.0	0.1			0.5			0.3	
Delay (s)	47.6	41.5		9.6	7.7			31.9			30.4	
Level of Service	D	D		A	A			C			C	
Approach Delay (s)		41.6			7.9			31.9			30.4	
Approach LOS		D			A			C			C	
Intersection Summary												
HCM Average Control Delay			34.2			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			92.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			84.9%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

Connery Associates

February 15, 2011

To: Robert Le Lacheur

From: John W. Connery

Re: Response to Fiscal Comments

Mark Mastroianni of Pulte Homes forwarded your comments to me and I have prepared the following responses. Please feel free to contact either Mark or myself with any questions. I am sure that we can address any issues raised and make changes to the report if deemed necessary.

I believe the current market information indicates that an 8 to 10 year time frame to construct and sell all the proposed housing is prudent given current economic conditions in the region and in Reading (Town). Obviously, Pulte Homes would like to reach stabilization sooner since that would be to their benefit, and I am sure they will certainly make every effort to do so. However, for the purposes of fiscal estimates I believe it is prudent to employ a somewhat more conservative timeline.

As part of the comment concerning project time frame you referenced the value of having a discounted present value as part of the information provided. As you noted this requires a number of assumptions but assuming we can agree on said assumptions there is no reason I cannot add estimated present value as a separate section or sub – section to the report. I selected the annual and future value approach to provide the Town the ability to observe how the proposed phased development fiscally responds over the construction period. In this manner the Town not only receives an estimated net future value but also the methodology provides evidence that at no time during construction does the project have a negative fiscal profile. Further, you will note that in order to preserve the 40R benefits associated with the proposal, the 40R element is Pulte's initial development component. Accordingly, the additional fiscal benefits associated with 40R will accrue as soon as they can commence development.

The report does assume a 17 million dollar current property valuation but you have noted in your comments that for various reasons the taxable value has been recently

reduced to approximately 12.6 million dollars. This change needs to be addressed and corrected on my part. The residual or current land value estimate is included in Table 2 because of project phasing. Specifically, some portion of the developable land will remain unimproved until the next appropriate phase; accordingly different parts of the overall site will be taxed using different methods of taxation until stabilization. It was my intent to prepare the most accurate annual revenue estimate as possible given the proposed phasing of the development. A reworking of Table 2 to include the reduced current taxable value will provide a more appropriate estimate. However, I should point out that the estimated cost to revenue ratio at project stabilization in 2019 will remain the same since as shown in Table 2 the residual land tax estimate is no longer a factor after 2016 and all estimated taxes are based on the full and fair market value method used for "for sale" properties". Therefore, the impact of the adjustment to current value will be to lower the *cumulative* taxable value achieved over the construction period while the estimated net revenue in 2019 remains the same since it is based on the estimated assessed value of the units with no residual land factor value.

Also, in Table 2 you point out that in the 2011 line item there is a math error. Upon examination you are correct since I applied the wrong tax factor. The total tax revenue should be about \$20,000 higher than shown. I can revise Table 2 line item for 2011 along with other issues as required by the Town. I believe that even after the above adjustments are made to Table 2 the estimated total revenue generated in 2019 will be approximately \$2,400,000 and that the proposal will generate a strong net fiscal benefit that can be sustained over the long term.

I also believe that the estimated condominium sales value of between \$300,000 and \$350,000 is not a high estimate and it reflects my intent to build in a conservative factor into the overall revenue estimate. I cannot estimate with any confidence the actual rate of increase of individual properties but I am confident that the real estate market is now and will continue to improve in Massachusetts and in Reading. The 3% value I reference in the report is an estimate of the estimated increase in overall annual municipal revenues. In recent years the rate of overall municipal revenue increase has exceeded 3% (not uncommon for the majority of Massachusetts communities) and therefore by using 3% to estimate the effect of increasing assessed value and tax rates over time I sought to insert a prudent revenue escalation factor in the timeline. Please see Section 4.1 paragraph 4 which outlines my assumptions concerning the rate of revenue increases to be experienced by the Town.

As you noted, I did use a lower estimate for excise taxes; again this was an effort to be conservative in my overall revenue projections. In this case it is based on the fact that condominium owners in the \$300,000 to \$350,000 range are likely to have somewhat lower household incomes and less expensive cars than owners of considerably more expensive single family homes which comprise the large majority of the community.

Regarding the issue of pre-existing municipal debt, I believe that the proposal cannot be held responsible for costs that were incurred before its existence. In this instance, the proposal has been specifically designed to be as fiscally positive as possible, to help alleviate the real estate tax pressure on the current taxpayers and help address pre-existing municipal debt.

In terms of municipal operating costs, the report was designed to address measurable and significant additional annual operating costs. In this case we may have differing opinions as to what is significant but I will make every attempt to address the issues you have raised. Specifically, the water and sewer costs will be addressed by paying annual fees for the services provided; accordingly there is no ongoing additional marginal cost. Similarly, most if not all the traditional DPW functions will be paid by the private developer (snow plowing, lighting interior road maintenance etc.). Further, the two key access roads (Route 28 and Interstate 95), the maintenance costs will be the responsibility of the Commonwealth and / or federal government and not the Town. As for the wear and tear on other Town roads due to new residents, all my research indicates that the annual maintenance cost per vehicular mile traveled is very low. Estimates usually range in the 1/10ths of a penny per mile or less. Accordingly I did not believe it was a measurable or significant cost given our population profile and site location and total annual average daily traffic in the Town but I am certainly willing to accept discussing the matter with your DPW staff.

Similarly, costs associated with Town Clerk activities are generally very small since most Town Clerk activities require a fee and also I do not see the proposal as requiring adding new staff to the Town Clerk's office. The comments relative to additional postage for census and mailing of tax bills are indisputable and we can add them to total annual cost if really necessary. They were not included in any attempt to reduce the municipal cost component but rather because they seemed de minimus and had no impact on the estimated magnitude of the fiscal profile. Similarly, the possibility of a new resident using the Town Forest and parks in general is not disputed. However as a measurable marginal cost, it seems de minimus and not an appropriate candidate for a per capita measurement.

I believe police and fire services have been appropriately measured since they mostly relate to population increases and additional structures. However, medical service calls are reimbursed by insurance. I do not necessarily agree that older people will burn more food thus increase municipal service costs by triggering alarms; honestly I have never seen a credible report or research on this issue. However, I would agree that with any new development there may be unfamiliarity by the new owners with alarm systems but I can find no evidence or studies to indicate that this is a permanent condition. Finally, I would like to stress that the Pulte Homes proposal is a home ownership development and it is in the best interests of the homeowners to protect and improve the value of their property.

I hope I have addressed your initial concerns and I look forward to continued discussion on ways to amend the fiscal report to meet the needs of the Town. I believe that no matter what approaches are selected relative to the issues noted above, the proposal will generate a strong net fiscal benefit due to the nature of the proposal and therefore provides a significant benefit over current conditions.

Respectfully,

John W. Connery

Cc. Mark Mastroianni, Pulte Homes